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A PORTRAIT OF THOMAS NUTTALL

While browsing in a bookshop in a little lane off Charing Cross Road, the great mart of second-hand books in London, I chanced to pick up in 1930 for six pence a portrait of Thomas Nuttall new to me. I submitted it to Mr. A. S. Skan, the librarian at the Royal Botanic Gardens at Kew, but although he is a man difficult to stump on bibliographic matters, he could not indicate the origin of the Nuttall portrait, evidently cut from some printed book.

It has always been my desire when writing a biography of a botanist to accompany it with a portrait. Such a portrait should, it seems to me, be of the man in his youth or in his prime—not when he is aged or enfeebled. This portrait represents Nuttall as a young man and is, I think, much to be preferred to the portrait so familiar to American botanists which shows him in extreme age.—THE EDITOR.



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SOME NOTES ON THE BRAZILIAN FLORA

DOUGLAS HOUGHTON CAMPBELL

In these days of easy and rapid travel, it is possible, with comparatively little effort, to visit pretty much every part of the world; and even the ordinary summer vacation is long enough to reach what a generation ago would have seemed impossibly remote regions.

Probably no country is so rich, botanically speaking, as Brazil, occupying as it does an area larger than the continental United States, and lying mostly within the tropics. It includes much the greatest expanse of equatorial territory of any country in the world; and this equatorial region, with the adjacent territory, supports the most extensive forest on the globe. A large part of the thousands of species of woody plants, as well as an immense number of herbaceous species, are still undescribed.

The exploration of the trackless jungles, often under water for months at a time, and exposed to attacks of hostile natives and deadly disease, is no doubt perilous, and only possible by well organized expeditions; but it is not at all necessary to expose one's self to these risks in order to get a very satisfactory idea of the more salient features of the rich Brazilian flora. It is now possible to make the voyage to Brazil not only with comfort, but with all the conveniences of a modern ocean liner. Less than a fortnight will carry the traveler from New York to Rio de Janeiro, and as the seasons are reversed, we may escape the mid-summer heat of New York, and after a perfect trip through the blue tropical seas, arrive in Rio at the end of winter, when the weather is about as perfect as we can find anywhere.

The beauty of the famous harbor of Rio cannot be exaggerated, and the city is one of the most attractive of world capitals. But what is of special interest to the botanist are the opportunities offered within the city for studying the native vegetation. The coastal region is very mountainous, and the highest peaks in Brazil are not very far from Rio. The seaward slopes receive a heavy rainfall, and support a dense forest of truly tropical character. Although Rio lies very near the Tropic of Capricorn, many species closely related to the Amazonian region are found. Within the city there are mountains over 2000 feet high on whose slopes are forest areas which are easily accessible and which afford a most satisfactory picture of the tropical jungle, the trees supporting huge lianas and loaded with epiphytes in great variety. Palms are a marked feature of these forests; ferns in bewildering variety, Araceae, gingers, Begonias, and other showy herbaceous forms and shrubs make up the dense undergrowth covering the floor of the jungle.

Rio was reached July 27, and I was surprised to find the air almost too cool after the voyage across the equator. The next day, with a chilly rain, was anything but tropical; but thereafter an unbroken succession of warm sunny days left little ground for complaint.

My first impression of the Brazilian forest was received a few days later when I took a popular motor trip over what was the most spec-

tacular drive that I have ever seen within a city. The road passed around the bases of two of the mountains rising within the city and reached an elevation of about 1000 feet with magnificent views over the city and the bay. In places it traversed magnificent forest, full of all manner of interesting things. Palms and tree-ferns in great variety were a feature of the vegetation, while the trees were draped with lianas among which climbing Araceae, *Philodendron* and others were conspicuous. Characteristic epiphytes, the bromeliads and orchids, as well as ferns, were in profusion. It was too early in the season to see these at their best, so except for a few bromeliads—probably species of *Tillandsia* whose scarlet-bracted spikes were conspicuous—none were seen in flower. An examination of the banks along the road showed great quantities of small ferns and liverworts, the latter being especially interesting.

Southern Brazil is famous for showy-flowered trees and shrubs. An *Erythrina* with vermilion-scarlet flowers was common, but still more striking was a species of *Tibouchina* (Melastomaceae), a shrub or small tree covered with big violet-purple blossoms. These hinted at what might be expected later in the season. Among the most characteristic smaller trees were several species of *Cecropia* with big palmate leaves somewhat suggesting *Ricinus*. Returning, the road followed the ocean shore for several miles. On the relatively bare and exposed hillsides, were many coarse bromeliads, some small columnar cacti, and Agave-like *Fourcroyas*.

The botanical garden in Rio is one of the best, in some respects perhaps second only to the famous gardens at Buitenzorg. In a recent number of "*Torreyana*"*, Mr. Norman Taylor has given an interesting account of the garden, with special attention to the economic plants. The gardens are most picturesquely placed at the foot of the Corcovado, the highest mountain in Rio, and the woods at the foot of the mountain immediately adjoin the gardens. The gardens were established more than a century ago, and therefore contain many magnificent specimens of trees, both native and exotic. Here may be seen full-grown specimens of many of the native forest trees, which give some hint of the amazing richness of the Brazilian forest. The collection of palms is probably second only to that at Buitenzorg and even the famous Javanese garden can show nothing equal to the great avenue of *Oreodoxa oleracea* (Fig. 1) (usually confused with *O. regia*, a much inferior species). This most beautiful of all palms was introduced from the West Indies, and the original tree, planted in 1808, is still flourishing. The great central avenue is over 80 years old, and the tree is now extensively planted all over the city, of which it is a most beautiful and striking feature.

Space forbids more than the briefest account of the trees. Of the native species, the largest number are Leguminosae—e. g. *Erythrina*, *Pithecolobium*, *Cassia*, *Inga*, *Caesalpinia*, etc.—each with many species and many with very showy flowers. Other characteristic families are Myrtaceae—*Myrtus*, *Eugenia*, etc.; Bombacaceae—*Bombax*, *Ceiba*

*March-April, 1929.

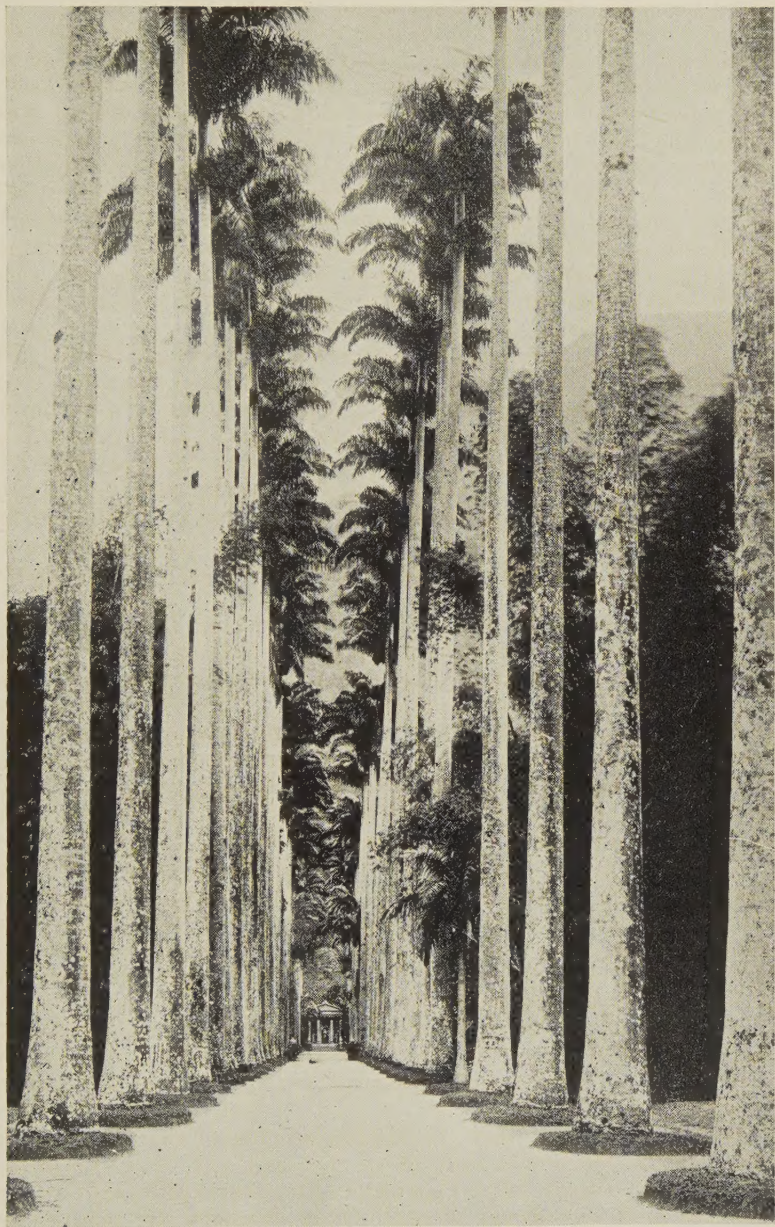


Fig. 1. Palm Avenue (*Oreodoxa oleracea*), Botanical Garden, Rio de Janeiro.

(Fig 2)—giants of the Brazilian forest; Jacaranda and Tecoma of the Bignoniaceae, with very showy flowers. There are also many Lauraceae, Anonaceae, Sapotaceae, Malpighiaceae. A very characteristic tree is the monkey-cup or "Sapucaya," related to the Brazil-nut (*Bertholletia*). The globular woody capsules open by a circular lid and are very conspicuous especially when the trees are bare of leaves as they are in winter. Of the Coniferae there were good specimens of the native *Podocarpus Sellowi* and *Araucaria brasiliana*. Several cypresses, some from Mexico and western America, seemed to find congenial conditions, but none of the pines or firs was noted. I was interested to see *Roupala heterophylla*, one of the few South American Proteaceae, a family mainly confined to Australia and South Africa.

Brazil probably surpasses all countries in the number of palms and these are well represented in the botanical garden. *Cocos* probably leads in number of species; others—e. g. *Attalea*, *Scheelia*, *Maximiliana*, have enormous pinnate leaves; *Euterpe*, among the most graceful of palms; *Mauritia*, stately fan palm. Of the less conspicuous genera, *Bactris* and *Geonoma* are common as under-growths in the forest.

The characteristic epiphytes are amply represented in the garden. Epiphytic ferns, bryophytes and lichens are abundant, the latter being especially common on the smooth trunks of some of the palms where the silvery-gray and pink discs are very conspicuous. Orchids are abundant, but only a few were in flower; and of the bromeliads, which are very numerous (both epiphytic and terrestrial species), the majority were not in bloom. Besides the many species of *Tillandsia*, may be mentioned species of *Bilbergia*, *Vriesia* and *Aechmea*. *Aechmea sphaerocephala*, a large terrestrial species, looks somewhat like an *Agave*, and the big globular inflorescences have broad blood-red bracts and blue flowers. Cacti also appear as epiphytes, species of *Phyllocactus* and *Rhipsalis*, the latter being very abundant about Rio. The great masses of pendant smooth cylindrical branches bearing tiny whitish flowers are very different from any other cacti. *Rhipsalis* is especially interesting as it is the only genus of Cactaceae which occurs in the Old World. *Rhipsalis cassytha* is said to occur both in Brazil and West Africa and is also recorded from Ceylon and Madagascar.

While to the botanist the rich collection of native plants will be of first interest, the splendid specimens of many exotics also offer a great attraction. Some, like the many gigantic specimens of the "Traveller's Tree" (*Ravenala*), are much the finest I have ever seen, and there are splendid examples of many other denizens of the eastern tropics. One of these, a very handsome ginger (*Phaemeria magnifica*), recalled happy collecting trips in the mountain forests of Java and Sumatra where it is common. Extensive collections of bamboos, screw-pines (*Pandanus*) and Old World palms, especially some very luxuriant rattans, were all reminiscent of the eastern tropics.

I am much indebted to the courtesy of the Director of the Gardens, Dr. Pacheco Leão, in my studies at the garden, and also for photographs of the garden. I would also like to express my thanks to Miss Maria Bandeira of the herbarium for frequent assistance.

The botanical attractions of Rio are by no means confined to the botanical garden. The city is adorned with numerous parks and gar-

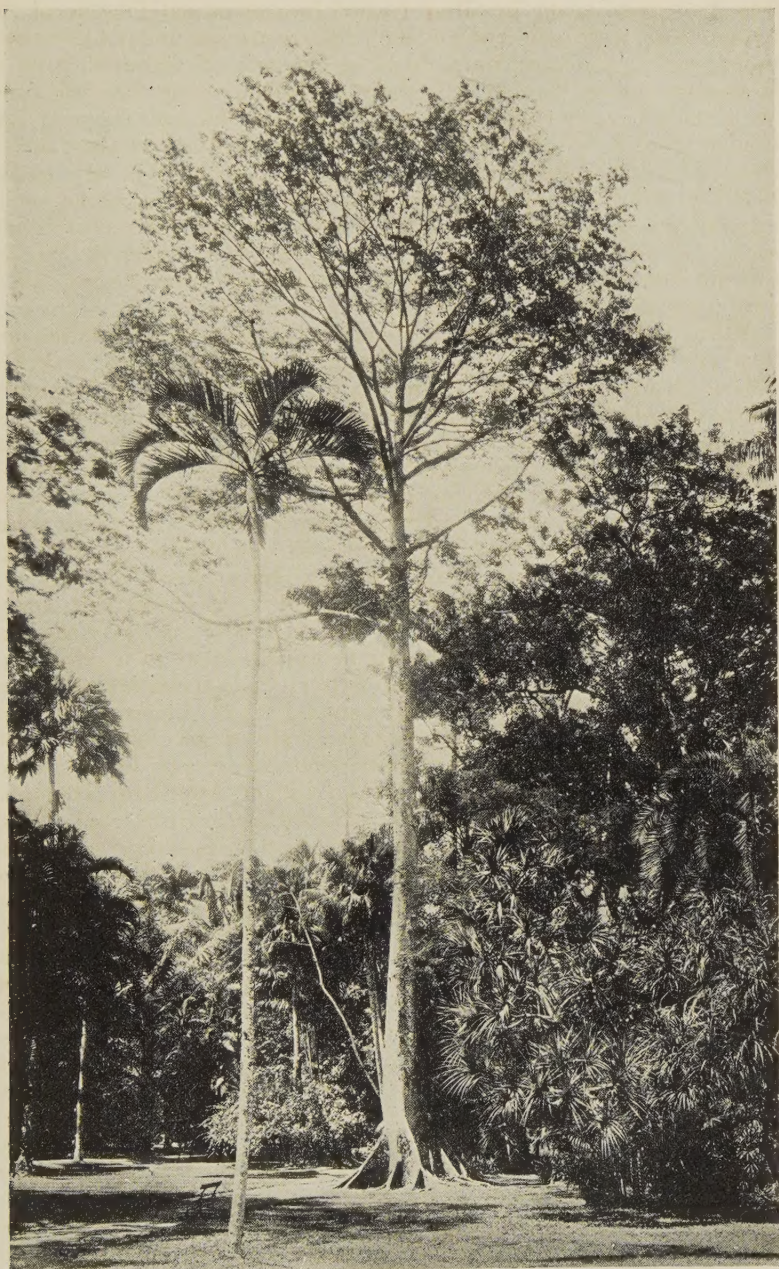


Fig. 2. Silk-cotton tree (*Ceiba pentandra*), Botanical Garden, Rio de Janeiro.

dens, both public and private, in which are growing many beautiful trees and shrubs, both native and exotic. Along the boulevards I noticed as a shade tree a small-leaved evergreen fig, probably *Ficus Benamina*, a fine East Indian species. *Oreodoxa oleracea* was very common as an avenue tree, and many other palms were frequent. At the time of my visit, August, the most conspicuous objects in the gardens were huge bushes of *Poinsettia* in full bloom. The Brazilians are great flower lovers, and the flower market in Rio is one of the sights of the city. The flowers included roses, pinks, dahlias, and other familiar ones; and, early as it was, I noted several orchids, one of which, a fine purple *Cattleya*, was evidently grown in quantity.

An interesting trip was made from Rio to Petropolis, a summer resort in the mountains at an elevation of about 2500 feet. The railway runs for a considerable distance near the shore of the bay through a more or less open country before the steep climb up the mountains. Some of the lowland is swampy and a few mangroves were noted, but no dense mangrove formation. The handsome fern, *Acrostichum aureum*, so often associated with the mangrove formation, was common. Another wide-spread littoral species was *Hibiscus tiliaceus*, the "Hau" of Hawaii. Much of the open country was covered with dense scrub looking as if the land had been cleared of forest. Palms were abundant, especially species of *Cocos* and *Acrocomia*, as well as smaller species which could not be identified. A fine scarlet *Erythrina* was abundant and many small flowered *Melastomaceae*, white and blue *Ipomoeas*, purple and red *Lantana*, and *Eupatorium*.

The ascent to Petropolis is very steep, and in places the mountainsides are densely wooded. About Petropolis the forest presents a less tropical aspect than that in Rio. The development of lianas and epiphytes is much less marked and indicates a colder and dryer climate. This is also evident in the smaller number of palms, *Araceae* and *Scitamineae*. Tree-ferns were common and taller than those near Rio; the walls and banks also furnished some interesting hepatics. The most novel botanical feature was *Araucaria brasiliana*, apparently indigenous. In the old tree all the branches die except those at the top which form an almost flat disc surmounting the bare trunk. In the gardens were unusually fine specimens of the Australasian *A. excelsa* and *A. Cookii*. Another very striking native tree was a large *Erythrina* which was a magnificent sight, as the leafless branches were solid masses of brilliant scarlet flowers.

The gardens of Petropolis were very attractive. The climate, which is cooler than that of Rio, seems particularly suited to flowers of warm temperate climes, while palms of various kinds also thrive. Roses were abundant and beautiful, while huge bushes of Indian *Azaleas* were masses of superb flowers. *Rhododendrons* and *Camellias* of tree-like dimensions were seen, but were much less floriferous than the *azaleas*. A few peach trees were in flower, but did not look at all flourishing, and I believe never ripen satisfactorily. *Bignonia venusta* and *Thunbergia grandiflora* were the most conspicuous creepers, and *Poinsettias* were common but not equal to those in Rio. It is said that orchids and other flowers are grown commercially on a large scale in Petropolis for the Rio market.

São Paulo, the second city of Brazil, is much less attractive than Rio from the tourist standpoint, being a big modern commercial city, the center of the great coffee industry; but it has certain very strong interests for the botanist. There is a fine scientific museum and a biological institute with excellent botanical collections. A notable feature of the museum is a small botanical garden with a most interesting collection of native plants, looking like a bit of real jungle and the result of many years' labor. This unique little forest shows well grown trees of various kinds, tree-ferns and palms, big lianas, numerous epiphytic orchids and bromeliads, and a large variety of herbaceous plants. Another part of the garden is devoted to plants of the open—cacti, Agaves, Fourcroya, Tibouchina, Salvia, various grasses, etc. There was also a small aquatic garden, where I recognized a familiar species of our eastern States, the pickerel weed, *Pontederia cordata*.

My main reason for visiting São Paulo was to see the Biological Station of Alto da Serra, which is about an hour's ride by train from São Paulo. São Paulo lies about 2500 feet above sea level on a plateau which descends abruptly to Santos, the port of São Paulo. The biological station is at the edge of the plateau, and close to the railway between the two cities. An excellent account of the station was given by Dr. A. F. Blakeslee* about two years ago, and it was his paper that called my attention to this remarkably interesting place. Too much praise cannot be given to Professor F. C. Hoehne, mainly through whose efforts this magnificent sample of the virgin mountain forest has been preserved. It is to be hoped that means may be secured for acquiring a much larger area, and for extending the facilities for the accommodation of visiting scientists. I shall not soon forget the delightful day spent at the station under the guidance of Professor Hoehne.

There is a very abrupt descent from the edge of the plateau, and the conformation is such that there is a very heavy rain-fall at the summit—about four meters annually. There is also much fog, so that there is developed a rain-forest of the most pronounced type with an amazingly luxuriant vegetation. It is hard to realize that it lies at the extreme verge of the tropics, as the aspect of the forest interior is almost that of an equatorial jungle, except that none of the trees are of great size and lianas are not conspicuous. Space forbids a detailed account of this truly wonderful forest, and only a few of the most notable features that impressed the writer can be mentioned. For a fuller account with a number of admirable photographs, the reader is referred to Dr. Blakeslee's interesting paper.

The heavy rainfall and constant humidity result in a profusion of epiphytic growths which surpasses anything which I can recall from the eastern tropics. The Bromeliaceae, a large number of which are epiphytes, comprise many species of *Tillandsia*, *Vriesia*, *Nidularia*, *Bilbergia* and others. Some were in flower, their red and yellow, or pink and blue inflorescences being very showy. Some 250 species of orchids have been collected including some very handsome ones. Several species were seen in flower, perhaps the most striking being

* A Paradise for Plant-lovers, Scientific Monthly, July, 1927.

Sophronitis coccinea, an epiphytic species with scarlet star-shaped flowers. This was quite common, and could not fail to attract the most unobservant. Of the terrestrial species, several specimens of the very showy *Zygopetalum Mackayii* were found in an open boggy place. Of the woody plants, species of *Gaultheria*, *Gaylussacia*, *Psidium*, *Fuchsia* and *Tibouchina* were noted; herbaceous species included, *Drosera villosa*, *Eriocaulon*, and the very remarkable *Utricularia reniformis* which grew in the water held between the leaf bases of a species of *Vriesia*. The basal portion of the *Utricularia*, lying in the water, shows the characteristic vesicles, but there are developed large orbicular aerial leaves which look almost like small water-lily leaves. The flowers are said to be large and showy. In this same boggy area *Sphagnum amoenum* was seen, and a striking lichen, *Cladonia pycnoclada*. There was the usual profusion of epiphytic bryophytes and ferns, among the latter some small *Hymenophyllaceae*. *Ophioglossum palmatum* has been collected here, but I was not fortunate enough to find it. A very characteristic epiphytic fern was *Blechnum scandens*. Tree-ferns, species of *Cyathea* and *Alsophila*, were conspicuous in the undergrowth and occasional specimens of *Marattia Kaulfussii* were seen. In places along the paths the banks yielded an abundant harvest of interesting mosses and hepatics, as well as some showy lichens and fungi.

Of the trees, the Leguminosae, so predominant in the dryer forests, were relatively few in number. Much more numerous were various *Myrtaceae*, *Lauraceae*, *Rubiaceae*, *Sapotaceae* and *Rutaceae*. A few small specimens of *Podocarpus Sellowii* were the sole representatives of the Gymnosperms. Palms were mostly the smaller species, e. g., *Bactris* and *Geonoma*; but there were some beautiful groups of the exquisite "Jussara" (*Euterpe edulis*).

No botanist visiting Brazil should fail to see the Biological Station at Alto da Serra.

Stanford University, July, 1929.

THE SANTA CRUZ ISLAND PINE

HERBERT L. MASON

The pines of insular California have been little understood due largely to the inaccessibility of some of their habitats. Because of the few collections and their wide dispersal throughout the herbaria of the world, the student of these plants has had in the past little material immediately at hand from which to obtain a correct concept of their range of variation and the limits of their distribution. There is little wonder then that many points of difference between two of these pines should have been overlooked for so long a time.

In the early history of west American botanical collecting, Dr. Palmer collected a pine on Guadalupe Island, 200 miles off the coast of northern Baja California. This was sent to Dr. Engelmann who recognized it as a two needle form of the Monterey Pine. He called it *Pinus insignis* var. *binata*, with the cones of *P. insignis* but the leaves

in pairs (1). As collections from the other islands came in, another pine was found which came to the hands of Lemmon. This came from Santa Cruz Island, 30 miles from the mainland of Alta California. His interpretation of Dr. Engelmann's description led him to suppose that his plant was the same as Dr. Engelmann's *P. insignis* var. *binata*. After adjusting the synonymy that existed in the nomenclature of the Monterey Pine, Lemmon published the name *P. radiata* var. *binata* (Engelm.) Lemmon and included the Santa Cruz Island specimens in the geographic range of the variety (2, 3).

Recently an opportunity was afforded the writer to visit the pine forests of Santa Cruz Island and to study in the field the habits and characters of the pines and to compare this material with specimens from the type locality of Palmer's material. It was found that Dr. Engelmann's description of *P. insignis* var. *binata*, though exceedingly brief, adequately described the specimens from Guadalupe Island but did not take care of the species with the smaller cone from Santa Cruz Island. This, it was found, in its aspect of growth and its manner of bearing cones, more closely resembled *Pinus muricata* Don than *Pinus radiata* Don, and it became evident that a new name was necessary to take care of this species.

Recent studies in the Pleistocene paleobotany of California by Dr. R. W. Chaney and the writer have disclosed that this Santa Cruz Island pine has been distinct at least since early Pleistocene and is now a remnant of a past flora (4). Fossils have been found in the Pleistocene sediments along Willow Creek on Santa Cruz Island where the forest existed contemporaneously with the northern elephant on what is now Santa Cruz Island. In the asphalt deposits at Carpinteria on the mainland of California, other fossils of this species are found in association with *Pinus radiata* Don and *Pinus muricata* Don. Evidence shows this forest to have sheltered the Dire Wolf (5), the last of the native North American horses and the giant condor, all of which are now extinct (5). Because this pine is clearly a relic of past times the name *Pinus remorata* is proposed for the species.

Pinus remorata Mason, n. sp. (*P. radiata* var. *binata* Lemmon, in part, West American Cone-bearers 42, 1895.) Slender tree 10 to 20 m. high, maturing to a flat-topped crown; bark furrowed, trunk seldom over 2 to 3 dm. in diameter; foliage dark green, needles in fascicles of two, 2 mm. wide, 8 to 20 cm. long, resin ducts 6 to 12, large; sheath persistent, gray, 10 to 15 mm. long; cone ovate, almost symmetrical, scarcely deflexed on the branches, borne in whorls of 1 to 7 and persistent for many years, 5 to 8 cm. long by 4 to 5 cm. wide, scales of ovulate catkins erect; umbos usually plane, only occasionally somewhat raised and rounded on one side of cone, each scale armed with a minute prickle, the prickle deciduous or sometimes persistent; seed black, somewhat ridged and muriculate, obliquely truncate above and with a rather stout wing.

Santa Cruz Island, California: H. L. Mason no. 4096, type; R. W. Chaney, Oct. 14, 1928. Cedros Island, Baja California: Anthony in 1896, U. C. Herb. no. 118,960.

The species as herein interpreted differs from *Pinus radiata* Don in that the needles are in fascicles of two instead of three. It has this character in common with *P. radiata* var. *binata* (Engelm.) Lemmon. However the needles are very much heavier than in either of these forms. There are also from 6 to 12 resin ducts to a leaf instead of the usual 2 in *P. radiata*. The cones are usually less than 8 cm. long instead of from 8 to 20 cm. They are almost symmetrical instead of strongly asymmetrical and stand almost at right angles to the branch instead of being closely reflexed. The umbos are plane or only slightly rounded instead of being strongly swollen. The tree however in its young stages, like young trees of *P. muricata* Don, resembles those of *P. radiata* very much. However the above points of difference clearly separate *P. remorata* from *P. radiata*. At the present time it is not associated with *P. radiata* but during the Pleistocene they grew together in the same forest.

As pointed out above, the species resembles in its aspect *Pinus muricata* Don more closely than it does *P. radiata* Don. It may be readily distinguished however on the basis of the leaves being a darker green and larger. The scale-tips of the ovulate catkin are erect instead of reflexed. In mature cones the tips of the scales are plane or slightly rounded instead of being produced into a strongly recurved hook. The cones are almost at right angles to the branch and are not reflexed as in *P. muricata*. Ecologically these two species have been associated since early Pleistocene and have been clearly differentiated throughout this time.

Associated with *Pinus remorata* on Santa Cruz Island is *P. muricata* Don, *Quercus tomentella* Engelm., *Lyonothamnus floribundus* Gray, *Photinia arbutifolia* Lindl., *Vaccinium ovatum* Pursh, *Arctostaphylos insularis* Greene, and *Arctostaphylos columbiana* Piper. It is of particular interest to note that *Photinia arbutifolia*, *Vaccinium ovatum*, and *Arctostaphylos columbiana* are characteristically associated with *Pinus muricata* throughout its range. It would seem that this insular pine forest represents the typical pine forest of the coastal and insular region during Pleistocene time of what is now California. The major differences between this forest and the pine forests now remnant in discontinuous localities along the coast seem to be due to the invasion of more highly successful continental species. It is probable that *P. remorata* was not able to compete on the mainland so it disappeared.

I wish to express my appreciation to Dr. R. W. Chaney of the Carnegie Institution of Washington and to Mr. F. F. Caire of Santa Cruz Island for their help in making this study possible.

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University of California, Berkeley.

PLANTAE OCCIDENTALES.—I.*

JOHN THOMAS HOWELL

NOTES ON *Calochortus weedii* var. *vestus* Purdy. In the hills on either side of the Santa Ana Canyon, Orange County, California, there grows a rather beautiful and unusual form of *Calochortus weedii* that has been identified as *C. weedii* var. *vestus* Purdy. Since this variety is known in the literature only from localities about one hundred miles to the northwest, the plant has been studied and the following notes have been written together with a description of the plant taken from the field records of the writer.

Calochortus weedii var. *vestus* Purdy (Proc. Cal. Acad. Sci. ser. 3, 2: 133, 1901) was described as a geographic form occurring in the vicinity of Santa Barbara but no specimen was cited as type and no station was named. As proposed in the type description, *C. weedii* var. *vestus* marked a transition in color, shape, and size of petals, as well as in geographic distribution, from *C. weedii* var. *purpurascens* Wats. (*C. plummerae* Greene) to *C. weedii* var. *obispoensis* Purdy (*C. obispoensis* Lemmon). Compared with *C. weedii* var. *purpurascens*, var. *vestus* had petals "much more truncated and curiously fringed with brown hairs, while the color is reddish brown." In the Flora of California (1: 298, 1922), Jepson identifies a collection made in the Ojai Valley, Ventura County by Olive Thacher (Herb. Jepson) as *C. weedii* var. *vestus*. Taking this collection as typical *C. weedii* var. *vestus* in the absence of further data, a comparison has shown that the plant from the Santa Ana Canyon region is the same. This occurrence of the variety in the area between the ranges of *C. plummerae* on the north and typical *C. weedii* on the south will perhaps further elucidate the relation of *C. plummerae* to *C. weedii*. It is probable that the variety is a genetic strain more closely related to *C. plummerae* and *C. weedii* than to *C. obispoensis* although more extended and detailed field studies on the many forms of these species are necessary before they can be satisfactorily treated in taxonomy.

The following field notes on *C. weedii* var. *vestus* were taken from plants growing on sandstone outcrops in the southern Puente Hills, June 22, 1927 (J. T. Howell no. 2572) and on steep rocky slopes in Claymine Canyon, Santa Ana Mts., July 3, 1927 (J. T. Howell no. 2636):

Plants 1-3 ft. tall; basal leaf 1, nearly equalling to slightly exceeding the height of the plant; calyx yellow, tinted or finely mottled with purple, in the earlier flowers with a tuft of hairs at the base, in later flowers the hairs nearly or quite lacking; corolla-segments varying from nearly unmarked greenish-yellow to nearly solid purple, the intermediate color-forms with the upper margin of the petal purple passing by ever-thinning flecks and splashes of purple to yellowish base, the inner surface and erose margin of the corolla-segments conspicuously long hairy, the hairs yellow with purple tips, arising from

* All specimens cited in the following notes are deposited in the Herbarium of the California Academy of Sciences unless otherwise specified.—J. T. HOWELL.

purple bases; gland-surface not hairy, the tips of the hairs around the gland approximate over it; gland forming a marked convexity on the outer surface.

A YELLOW-FLOWERED SPECIES OF *PURPUSIA*. The receipt of an excellent flowering specimen of *Purpusia* from Mr. Frank W. Peirson collected in Arizona led to a study of the yellow-flowered form collected there on two earlier occasions by Miss Alice Eastwood and named by her in the herbarium, first as a variety of *P. saxosa* Brandege and later as a species. A comparison of these specimens with the type collection of *P. saxosa* (Sheep Mts., Nevada, *Purpus* in 1898; Herb. U. C.) showed the Arizona plant to be specifically distinct. Miss Eastwood has kindly permitted me to publish the description of the species at this time.

Purpusia arizonica Eastwood, spec. nov. (*P. saxosa* var. *flava* Eastwood, in herb.) Stems 1-2 dm. tall, glandular-puberulent, arising from thickened caudex closely beset with old persistent leaf-bases; basal leaves odd-pinnate, glandular-hairy, 5-11 cm. long, with 3-5 pairs of leaflets; leaflets orbicular, 0.5-1 cm. long, palmately 5-10-lobed or -divided, the lobes oblong, obtuse, the lower leaflets petiolulate, the upper leaflets sessile; cauline leaves odd-pinnate with 1 or 2 pairs of leaflets, or simple and irregularly cleft or divided; stipules narrowly ovate or ovate-lanceolate, 4-8 mm. long, entire; inflorescence loosely cymose-paniculate, or racemose with solitary flowers in the axils of the lower cauline leaves; pedicels 1-3 cm. long; hypanthium campanulate, 2-4 mm. long, 2-4 mm. wide at upper end, the length equalling the width; sepals 2-4 mm. long, ovate to ovate-lanceolate; petals 3-4 mm. long, 1-2 mm. wide, yellow; stamens 5, opposite the sepals; pistils 7; achenes 1 or 2, 2-2.5 mm. long, oblong-reniform, the sides longitudinally ribbed; receptacle 1.5 mm. long, one-half to nearly as long as the hypanthium, long-hairy, conical, obtuse.

The following specimens, all from the Grand Canyon of the Colorado River, Arizona, have been examined and are in the Herbarium of the California Academy of Sciences: on the rim near Bright Angel, Eastwood no. 5662 (type, Herb. Cal. Acad. Sci. no. 75,599); edge of cliff at El Tovar, Eastwood no. 3778 (type of *Purpusia saxosa* var. *flava* Eastwood); growing along foot of cliff, Cliff Spring, 1 mile from Cape Royal, Peirson no. 7427.

This species is established on excellent characters of the hypanthium, achenes and receptacle. In *P. saxosa* the hypanthium is turbinate, the hypanthium-tube is constricted above the swollen, truncate base, and it is always longer than wide; in *P. arizonica* the hypanthium is truly campanulate, the tube is not constricted, the base is gradually rounded to the pedicel, and the length equals or is sometimes less than the width. The achenes of *P. saxosa* are smooth while in this species the sides of the achenes are longitudinally wrinkly-ribbed, the ribs converging on the inner angle. The remarkable, hairy receptacle which is so slender and long in *P. saxosa*, in *P. arizonica* is conic-columnar and shorter. In the former species the receptacle nearly equals or sometimes even exceeds the hypanthium in length, while in the latter it varies

from one-half to nearly as long as the hypanthium. And the yellow color of the petals in *P. arizonica* is an evident mark by which it can be readily distinguished from the white-flowered *P. saxosa*.

From a consideration of these characters it appears that *P. arizonica* is the species nearer *Potentilla* than is *P. saxosa*. *Purpusia*, a genus evidently derived from the *Potentilla* plexus, differs from *Potentilla* in lacking bractlets on the hypanthium and in having a highly specialized receptacle. The characters of the corolla, hypanthium, and receptacle in *Potentilla* resemble more closely the yellow petals, the campanulate hypanthium, and the less elongated receptacle in *P. arizonica* than the characters of these same structures in *P. saxosa*. In the latter species, the white corolla, the turbinate hypanthium, and the elongated receptacle appear to be more highly modified and to indicate an evolutionary advance beyond *P. arizonica*.

THE FRUIT OF *DIRCA OCCIDENTALIS* GRAY. On the shaded, north-east slope of Grizzly Peak in the Berkeley Hills, California, *Dirca occidentalis* Gray was collected in fruit on June 15, 1930 (J. T. Howell no. 5302). A review of the literature relating to the plant disclosed the fact that the character of the mature fruit has hitherto been unknown. At maturity the fruit is a smooth-skinned, obliquely pear-shaped drupe with thin mesocarp and large, thin-shelled stone. In color it is a light yellowish-green. When it is ripe and while it is still green and moist, the fruit falls to the ground at the slightest touch, there drying and becoming light brown. At the time the collection was made some fruits still remained on the bushes but most of them had fallen and were in all stages of drying.

OBSERVATIONS IN *ARCTOSTAPHYLOS*. Those fortunate enough to accompany the field excursion of the California Botanical Society to the Mt. St. Helena region, California, on March 23, 1930, were thrilled by a remarkable display of several species of *Arctostaphylos* at the height of bloom. The numerous shrubs laden with pink and white waxen flowers presented a truly glorious sight and in the presence of such a show it was difficult to refrain from remarking and believing that the manzanitas are surely to be counted among the loveliest of our native plants. On rocky slopes or in shallow soil overlaying the volcanic rocks of the region, five species were found growing together, *A. manzanita* Parry, *A. stanfordiana* Parry, *A. elegans* Jepson, *A. canescens* Eastwood, and *A. glandulosa* Eastwood, while *A. viscida* Parry, a sixth species, was seen later in the day on the road to Middletown.

Of all these species, *A. elegans* Jepson was by far the most interesting botanically, not only because it is one of the rarest of manzanitas but because a description of flowering specimens has never been written. In the "Revision of California Species of the Genus *Arctostaphylos*," Jepson states that *A. elegans* "is still known only by the original collection" from Mt. Konocti, Lake County, in 1892 (Madroño 1: 80,—1922). However, the occurrence of *A. elegans* on Mt. St. Helena has been known since September, 1918, when Alice Eastwood collected a suite of fruiting specimens (Eastwood nos. 7939, 7942, 7944, 7945, 7949, 7950). On May 9, 1923, on Mt. St. Helena, Miss

Eastwood collected the first flowering specimen (no. 11,764), as well as a specimen showing immature fruit (no. 11,760); and, in October, 1924, Mrs. B. R. Jackson made a collection of mature fruiting material on the mountain.

No further collections were made until March, 1930, when two additional stations for *A. elegans* were found on the field excursion described above. One of these was in the Crater Country southeast of Mt. St. Helena, Napa County, where excellent flowering specimens were collected (J. T. Howell no. 4561), and the other was on the Adams Springs road, 4 miles northeast of Middletown, Lake County, where immature fruit was obtained (J. T. Howell no. 4567). In the flowering specimen the sepals were somewhat ciliate, the corolla was pale pink (not as deep as in *A. stanfordiana*), and the ovary was densely stipitate-glandular, the glands being red. The flower in shape, color, and aspect resembled the flower of *A. manzanita* rather than that of *A. stanfordiana*. On July 13, 1930, fruiting material from the plants in the Crater Country was obtained (J. T. Howell nos. 5354, 5355), and although the fruit was well formed the pulp was green and still moist. The surface of the fruits was glandular-viscid and dried corollas and stamens adhered in nearly every case.

A second discovery on the earlier trip to the Crater Country was evidence of natural layering in four species, *A. elegans*, *A. stanfordiana*, *A. manzanita*, and *A. viscida*. In these species, branches which lie along the ground, root abundantly along the lower side where they are in contact with the ground. In several cases rejuvenation and increased girth was very decided in the stem above the layered part, in one the stem above the layered part having nearly two times the diameter of the stem below that part. In the erect forms, layering has only been reported in *A. pungens* H. B. K., a species closely related to the species named above (Jepson, *Man. Fl. Pl. Cal.*, 747,—1925).

TWO PHACELIAS NEW TO THE FLORA OF CALIFORNIA. *PHACELIA PAUCIFLORA* WATS., *Proc. Amer. Acad.* 24: 61, 1889; Brand in *Das Pflanzenreich* IV. 251: 112.—1913. Heretofore known only from Lower California, this *Phacelia* has now been found in extreme southern California at the foot of the Mountain Spring Grade, San Diego County, where it was collected in April, 1922, by Mr. F. W. Peirson (Peirson no. 2862). Brand, *loc. cit.*, accredits the plant to California—"Kalifornien: Berge an der Los Angeles Bai (nach Watson)"—but the Los Angeles Bay referred to is the type locality of the species and is in Lower California. The plants collected by Mr. Peirson agree with the descriptions by Watson and Brand in all but a few details. The plants of this collection are smaller and are more slender, the stems being not over 15 cm. long, half as long as those described before. The sepals are not lanceolate as stated by Brand but are slender-oblancoate and these definitely exceed the corolla by 1.5 to 2 mm. Of the 8 ovules found in each capsule probably only 4 seeds develop and mature.

It has been pointed out by both Watson, *loc. cit.*, and Brand, *loc. cit.*, that this plant is very closely related to *P. hispida* Gray. *Phacelia*

hispida is placed in section *Euphacelia* of the genus *Phacelia*, the section characterized by 4 ovules to each capsule. *Phacelia pauciflora* is definitely placed in the section *Eutoca* on the character of 8 ovules to each capsule. However it is believed that the close relation of *P. pauciflora* to *P. hispida* as shown in characters of habit, foliage, and flower indicates that *P. pauciflora* is another species tending to break down the limits of these sections of *Phacelia* that are based solely on ovule number.

PHACELIA IVESIANA TORR. VAR. *GLANDULIFERA* (PIPER) NELSON & MACBRIDE, in Macbride, Contrib. Gray Herb. n. ser. no. 49: 40,—1917. (*P. glandulifera* Piper, Contrib. U. S. Nat. Herb. 11: 472,—1906. *P. ivesiana* f. *glandulifera* (Piper) Brand, Das Pflanzenreich IV. 251: 126,—1913.) According to Macbride, loc. cit., this variety, which is distinguished from typical *P. ivesiana* by the glandular calyx and the longer corolla, is restricted to Washington, Oregon, and Idaho, while the typical form is found from Wyoming to California. The variety may now be reported from eastern California where it has been collected in the Panamint Range, J. T. Howell no. 4037. There the plants grow in shallow soil of a rocky slope near the summit of the ridge between Surprise and Hall cañons at an elevation of 8500 feet. This station lies just under the lower edge of the Boreal Zone or the Limber Pine Belt. The plant belongs perhaps to the desert Transition Zone, but in the Panamint Range this zone has but a wavering and uncertain existence, the Piñon Pine and Juniper Belt extending up to the lower edge of the Limber Pine Belt. It is of interest to note here that typical *P. ivesiana*, with non-glandular calyx and small corolla, was collected in the same region by Coville in the Lower Sonoran Zone (Larrea Belt) in Panamint Valley near the Hot Springs at an elevation of 1200 feet, a few miles westward from the place where the variety has been found.

EUPATORIUM GLANDULOSUM H. B. K., ADVENTIVE. Most exotics introduced unbidden into our natural societies of native plants become at once vexing weeds without attraction. *Eupatorium glandulosum* H. B. K., which has become established at several stations in coastal central California and is not yet known in the floras of the region, is, on the contrary, a plant able to find a place in moist, brushy situations and to be equally attractive with its indigenous neighbors. At one station in a wet hollow on hills overlooking the Golden Gate from the north, this species simulates a native with its dense shrubby growth of three feet and its abundance of white bloom and green foliage (J. T. Howell no. 4293). Again, on the south slope of Strawberry Canyon, Berkeley Hills in a shaded thicket of *Ribes glutinosum*, *Rubus parviflorus*, *Rhus diversiloba*, and *Baccharis pilularis*, the *Eupatorium* has been found, this time tall and slender in habit, half-supported by surrounding shrubs, and bearing its flower-clusters ten to twelve feet above the ground (J. T. Howell no. 4714). Big Sur, Monterey County, on the coastal slope of the Santa Lucia Range, is a third locality where this attractive Mexican species is adventive (Elsie Burnell in 1930).

California Academy of Sciences, San Francisco.

NOTES AND NEWS

Dr. H. A. Spoehr has resigned his position as chairman of the Division of Plant Biology, Carnegie Institution of Washington with headquarters at Stanford University, in order to join the Rockefeller Foundation as director of the natural science departments. He continues his duties with the Carnegie Institution until September 1.

At present, seven workers comprise the scientific staff at the Carnegie Laboratory on the Stanford University campus. Those engaged in researches on photosynthesis are Dr. H. A. Spoehr, Dr. James H. C. Smith, Dr. Harold Strain, and Harold W. Milner. The workers in experimental taxonomy are Dr. H. M. Hall, Dr. David D. Keck, and William M. Heusi.

Among those who have recently been elected to membership in the Society are: Dr. D. H. Campbell, Stanford University; Miss M. E. Grinnell, Berkeley; Mrs. S. W. Hutchinson, Los Angeles; Mrs. M. McCollum, Oakland; Miss Elsie Osgood, New Jersey; Mr. Eric Walther, San Francisco; Mr. Waldo E. Wood, Susanville.

Volume I of "Madroño" was completed with the seventeenth issue which contained frontispiece, title page, and index. The volume is now available from the secretary of the Society at \$5 per volume. A limited number of earlier issues, except number 6, are available at the cost of fifty cents each to members of the Society and others who wish to complete their sets.

Dr. Elmer D. Merrill, who for the last six years was Dean of the College of Agriculture of the University of California, became Director-in-Chief of the New York Botanical Garden, Jan. 1, 1930.

At Berkeley, the biological departments of the University of California now occupy the new Life Science Building, completed during the past spring. The entire Botany Department, including the herbarium and the department library, is now installed in the new building.

"A Geographic and Taxonomic Study of the California Species of the Genus *Ceanothus*" by H. E. McMinn, which appeared in the fourth number of Contributions from the Dudley Herbarium, Stanford University (June, 1930), is a synopsis of the genus as it occurs in California. The paper opens with a consideration of the origin and subsequent migration of the species and a discussion of criteria for limiting sections and species. In "Some Undescribed Plants from the Pacific States" (loc. cit.) Elmer I. Applegate describes a new species of *Mertensia* and of *Erythronium* from Oregon and a new *Erythronium*, *E. tuolumnense*, from the foothills of the Sierra Nevada in Tuolumne County, California.

MEMORIAL NOTE ON DR. PATRICK B. KENNEDY

W. W. MACKIE

In the passing of Dr. P. B. Kennedy we have suffered the loss of a keen botanist and a genial companion and friend. His services as president of the California Botanical Society from 1915 to 1918 are gratefully remembered. Dr. Kennedy's interests lay primarily in the field of botany but his application of botany to the service of agriculture makes it well nigh impossible to fill his place in agronomy. His keenest interest was the investigation of forage crops, especially the grasses and clovers. A new and extremely valuable work on native California clovers was left in almost completed manuscript form.

When trials and irritations of the kind which follow us through life threatened to worry him, he would find solace and constructive interest in working with his grasses. The historic relations which exist between the progress of humanity and the economic resources of the family Gramineae appeared to catch his unflagging imagination and interest and gave a depth to his vision which carried him through many trials.

With all his work and heavy burdens he maintained a cheerful and happy personality. He worked hard and he played hard. No longer will his hearty companionate laugh cheer us over our dark days. We shall greatly miss him.

THE ANNUAL DINNER FOR 1930

The annual dinner of the California Botanical Society was held at the University of California, Berkeley, on Mar. 15, 1930. In the afternoon at 2:30 in Room 212 Wheeler Hall, a scientific program was presented as a symposium on "The Phylogeny of Flowering Plants", and the speakers, representing several aspects of Systematic Botany, discussed contributions to phylogenetic matters from their particular fields. Prof. George J. Peirce, President of the Society and Professor of Botany, Stanford University, was chairman of the meeting. Mr. H. L. Mason, Department of Botany, University of California, told of evidences of descent from studies in Paleobotany, using as examples the researches in the fossil record of western North America. An outline of contributions to our understanding of plant relationship from the fields of Genetics and Ecology, and an account of his work in Experimental Taxonomy were given by Dr. H. M. Hall, Division of Plant Biology, Carnegie Institution of Washington. Dr. D. H. Campbell, Professor-emeritus of Botany, Stanford University, discussed the origin and distribution of flowering plants. The present distribution of specialized groups of plants in the southern hemi-

sphere and their probable origin was outlined by Dr. W. A. Setchell, Professor of Botany, University of California.

At 6:30 p. m. about seventy members of the Society and their friends met at dinner in the club rooms of the Stephens Union, University of California. Dr. George J. Peirce, President of the Society, presided as toastmaster. During the dinner all paused and listened in reverent quiet to the words of memorial spoken by Dr. W. W. Mackie for Dr. P. B. Kennedy, past-President and ever-faithful member of the Society. Prof. H. E. McMinn, First Vice-President of the Society and Professor of Botany, Mills College, remarked on the use of native plants for ornamental growing and announced the distribution of a list of selected native plants suitable for culture. During the dinner several enjoyable vocal and instrumental numbers were presented under the direction of Mr. W. W. Carruth, well-known musician of the Society. On conclusion of the dinner the principal speaker of the evening, Dr. E. P. Meinecke, Principal Pathologist, Forest Pathology, Bureau of Plant Industry, U. S. D. A., was introduced and told of the injury being incurred by the redwood with the increase in tourist travel and the efforts of the Forest Service, both state and national, to prevent it. Thereafter the meeting adjourned and a short period was passed visiting with friends and speaking with Dr. Meinecke or Dr. Peirce. The proceedings of the day were arranged under the chairmanship of Mr. H. L. Mason.—JOHN THOMAS HOWELL.

PLANTAE OCCIDENTALES.—II.*

JOHN THOMAS HOWELL

A MAROON WALLFLOWER. In May just passed there was collected from grassy meadows of the southern Sierra Nevada at Glenville a beautiful and noteworthy form of *Erysimum asperum* DC. Taller than most forms of the species and distinguished by a large orange-yellow flower turning soon to rich tones of reddish-brown, the plant was noted at once as a marked variant within the file of our western wallflowers. And more recently, the pubescence, which is nearly scabrous to touch, has been found to be more finely stellate than the pubescence of any form yet known in *E. asperum*. Though the hairs on the stem of the plant are generally 2- or 3-parted, the hairs of the leaves, pedicels, sepals, petals and siliques are almost uniformly 3- to 6-parted. This variant is here named and described.

Erysimum asperum var. *stellatum* J. T. Howell, var. nov. Root biennial; stem 8.5 dm. tall, harshly pubescent with branched hairs; leaves repand-dentate, oblong-oblancheolate, narrowed below to a slender petiole or the uppermost nearly sessile, scaberrulose, the hairs stellate-parted: flowers large, mostly over 1.5 cm. long; petals orange, soon becoming reddish-brown or maroon, markedly stellate-puberu-

*All specimens cited herein are in the Herbarium of the California Academy of Sciences unless otherwise indicated.—J.T.H.

lent on the claw and on the lower side of the blade just above the claw; siliques to 10 cm. long, quadrangular, ascending, very shortly beaked.

Glenville, western foothills of the Greenhorn Range, Kern Co., J. T. Howell no. 5153 (Herb. Cal. Acad. Sci. no. 178506, type); Greenhorn Range, Kern Co., Weston no. 114; Big Sandy Creek, Fresno Co., McDonald in 1915 (approaching the usual Sierran foothill form of *E. asperum* in flower-color).

TWO LITTLE-KNOWN EUPHORBIAS. From the numerous collections of prostrate desert Euphorbias made by the writer in the past several years two have been found that are marked by unusual characters of structure and appearance so that it seems appropriate to describe their occurrence in these notes. The two collections are referred to species described by Millspaugh and though authentic material has not been available for comparison, the specimens so closely agree with the detailed original descriptions that the determinations are believed to be nearly if not quite correct.

EUPHORBIA VALLIS-MORTAE (MILLSP.) J. T. Howell, comb. nov. (*Chamaesyce vallis-mortae* Millsp., Field Mus. Bot. Ser. 2: 403,—1916.) This inappropriately named species was described from a specimen collected on the Death Valley Expedition by Coville and Funston (no. 1008), not in Death Valley, but between Mojave and Keeler at an altitude of 750 meters. In the same region the specimens on which these studies are founded was collected: mud hills 1 mile north of Ricardo, Red Rock Canyon region, Kern Co., J. T. Howell no. 4973. Millspaugh places this distinctive plant "near *Chamaesyce tonsita* Millsp." (*E. polycarpa hirtella* Boiss.) but from that form and from the other prostrate Euphorbias of southern California *E. vallis-mortae* is readily distinguished by the velvety pubescence, the larger leaves, and the bristly-margined, crenulate-denticulate gland-appendages. In aspect and vesture it resembles *E. leucophylla* Benth. which is typical at Cape San Lucas, Lower California.

EUPHORBIA PSEUDOSERPYPHILLIFOLIA MILLSP., Pitt. 2: 87 (1890). (*Chamaesyce pseudoserpyllifolia* Millsp., Field Mus. Bot. Ser. 2: 411,—1916.) This plant closely resembles *E. polycarpa* in habit and it was believed to be just another variant of that species when it was found growing with *E. polycarpa hirtella* Boiss. in dry silty soil near Palm Wash, west side of the Colorado Desert, San Diego Co., California (J. T. Howell no. 3488). The plant, however, is more nearly related to *E. ocellata* D. & H. as is evident in the pezizoid, substipitate, red and yellow glands of the involucre. From that species *E. pseudoserpyllifolia* is marked by the ovate-oblong, nearly symmetrical leaves; the red, turbinate involucre: the very short, sparsely comose-ciliate involucreal lobes; and the "elongated, quadrangular, pointed, very slightly rugose" seeds. From *E. arenicola* Parish, the Mojavan aspect of *E. ocellata*, *E. pseudoserpyllifolia* differs

by the same characters which distinguish it from *E. ocellata*. The specimen cited above agrees with the description of the type specimen collected in the valley of the Gila River, Arizona, by P. F. Mohr in 1873, except that in the Californian material the stipules are not hairy and the stigmas are clavate rather than capitate.

EUPHORBIA HELIOSCOPIA L. A widespread weed in eastern United States, this European plant has been collected and reported a pest in fields at Elk, Mendocino Co. (Myszka in 1930). The occurrence of this species has been reported in Oregon (Britton and Brown, *Illustrated Flora*, ed. 2, 2: 473).

LYTHRUM TRIBRACTEATUM SALZM. (*L. bibracteatum* Salzm., in Boiss., *Fl. Orient.* 2: 740). In the vicinity of Elmira, Solano Co., the beds of summer-dried rain-pools are enlivened with brightly flowered mats of this annual which is adventive from lands around the Mediterranean Sea (J. T. Howell no. 5208). While growing it is readily distinguished from the indigenous species of *Lythrum* in California by the foliose, prostrate stems and by the numerous small but attractive rose flowers. Technically it differs from our western species in the very short calyx-teeth and appendages and in the unequal insertion of the included stamens. The relatively conspicuous foliaceous bracts subtending the flowers would place the Elmira plant as var. *candollea* Koehne (*Das Pflanzenreich*, IV. 216: 64, —1903).

POGOGYNE IN SOUTHERN OREGON. One of the genera most typical of the Californian floral province is *Pogogyne*, the species of which so frequently enpurple the summer-dried flats of vernal pools and low valley lands. In July, 1887, one of the species of this genus was collected in southern Oregon at Central Point, Jackson County, by Thomas Howell, admirable botanist of Portland, Oregon. Due to the late season in which the collection was made, all the corollas were withered and appeared shrivelled. It is probable that, because of this, the plant was determined and distributed by Howell as *P. douglasii* Benth. and the occurrence of that species in Oregon was reported in his "*Flora of Northwest America*" (551, —1903). In recent studies in the genus *Pogogyne* the plant from southern Oregon is found to be *P. zizyphoroides* Benth., a species distinguished from *P. douglasii* by smaller corolla and by two fertile stamens instead of four. The two following collections have been examined: Central Point, Jackson Co., Howell no. 777 in 1887; road to Gold Hill, Sam's Valley Desert, Jackson Co., Henderson nos. 12383 and 12400 in 1930. In California, *P. zizyphoroides* is not infrequent in clay soil of shallow depressions from the central San Joaquin Valley to the northern Sacramento Valley.

LACTUCA SALIGNA L. In central California the Willow Lettuce has become a widely dispersed weed growing along roads and in

waste places. Originating in the Mediterranean region and in central western Europe, the plant thrives in its adopted home and blossoms and fruits during the dry season. In habit this species is markedly different from all other lettuces growing in California, the stems being several from the base and bearing above a distinctly virgate inflorescence. The heads are glomerate-congested on very short axillary branchlets and these are arranged in a subspicate manner along the stems. The following Californian specimens indicate the wide distribution of this species: a common field weed, Kelseyville, Lake Co., Blankinship in 1928; 4 miles west of Rio Vista Junction, Solano Co., J. T. Howell no. 5535; Strawberry Canyon, Berkeley Hills, Alameda Co., J. T. Howell no. 5712; hills above Millbrae, San Mateo Co., J. T. Howell no. 5711.

GRINDELIA PROCERA GREENE, Manual of Bay Region Bot. 172 (1894). The identity of this species, first collected from "bottom lands of the lower San Joaquin, in places inundated in spring and early summer", has been obscured for many years and authentic material in herbaria has been scant or none. Tall and erect of habit and crowned by a broad panicle of numerous yellow-flowered heads, this *Grindelia* is one of the most attractive of our Californian species. The pale-barked stems which rise anew each season are several from the base of the plant and are generally unbranched for over half their length. The broadly sessile leaves are not so leathery as those of *G. cuneifolia*, nor are they so glutinous as those of *G. camporum*. The involucre are low and broad, and the short bracts are either erect or slightly squarrose near the tip. The rays are oblanceolate and vary in number from 33 to 44, about two times the number found in topotypical *G. camporum*. The small ribbed achenes are only about 2 mm. long and the obliquely toothed crown, so frequent in other Californian species, is nearly obsolete.

Although *G. procera* reaches its highest development on the rich delta and bottom lands of the lower San Joaquin River, the species has been collected in excellent form in the sandy loam of the San Joaquin Valley near Modesto and in clay soil on the east slope of the Oakland Hills where it is perhaps a recent introduction. During the past winter plants of both *G. procera* and *G. camporum* were raised from seed in the clay soil of the Botanical Garden of the University of California. Both species produced robust plants, *G. procera* attaining a height of about 20 dm. The very different developmental stages exhibited by the two plants were especially striking. The seedling plant of *G. camporum* produced a many-leaved rosette that lasted until late spring, a terminal shoot and axillary branches then developing together. The seedling of *G. procera* produced few basal leaves, scarcely to be called a rosette, and at an early date sent upward a solitary terminal shoot, the basal branches not developing until later.

The following collections of *G. procera* are in the Herbarium of the California Academy of Sciences: Porterville, Tulare Co., Kelly

in 1921; near Modesto, Stanislaus Co., J. T. Howell 4351; 1 mile west of San Joaquin River Bridge near Tracy, San Joaquin Co., J. T. Howell 5550; low delta lands 1 mile west of Holt, San Joaquin Co., J. T. Howell 5511; Oakland Hills near Oak Spring, Contra Costa Co., J. T. Howell 5486; Botanical Garden, University of California, J. T. Howell, May 27, 1930 (seedling), Sept. 21, 1930 (flowers), and Nov. 19, 1930 (fruit).

A NEW CALIFORNIAN GRINDELIA. *Grindelia bracteosa* J. T. Howell, spec. nov. Stems one to several from the crown of the stout perennial tap-root, 6 dm. tall, erect, glabrous, yellow to pale brown; basal leaves not known; cauline leaves 2-6 cm. long, 0.5-2 cm. wide, lanceolate to oblong and broadly oblanceolate, sessile by broad slightly decurrent base, sharply and rather coarsely serrate, the teeth and acute apex mucronulate, the margin with numerous short scabrous hairs or sometimes these scattered over the surface of the leaf, both surfaces with numerous punctate glands; heads paniculately arranged, solitary at ends of stems or branchlets, 1-2.5 cm. broad, 0.8-1.5 cm. high, frequently subtended by leafy bracts; involucre bracts very numerous in closely imbricated ranks, punctate glandular, attenuate into a closely recurved tip; flowers all disk-flowers or rarely 1 or few minute ray-flowers; ray-flowers when present scarcely equalling the disk, 6 mm. or less long, 3-toothed or entire at apex; disk-flowers 5-6 mm. long; pappus-awns 2-4, 4.5 mm. long; achenes 4-5.5 mm. long, obliquely toothed at the summit, the teeth irregular and disposed in two sets.

Specimens examined: north side of Santa Ana Canyon, Orange County, at 600 feet, J. T. Howell no. 2786 (type, Cal. Acad. Herb. no. 171,694); near Aliso Canyon, southern Puente Hills, San Bernardino County, E. R. Johnson, June 8, 1928.

Occasional on open grassy hills and mesas in heavy clay soil, this plant occurs with such other summer-blooming perennials of similar habitat as *Cucurbita foetidissima* H. B. K., *Asclepias eriocarpa* Benth., and *Malacothrix saxatilis* T. & G., and such annuals as *Trichostema lanceolatum* Benth. and *Stephanomeria virgata* Benth. It appears to be most closely related to the maritime species, *Grindelia robusta* Nutt., from which it may be distinguished by the complete or nearly complete suppression of the ray-corollas and the more numerous and closely imbricated involucre bracts. It differs from the other species of *Grindelia* occurring in southern California, *G. camporum* Greene, in the discoid heads, the frequently leafy-bracted heads, and the size of leaves and involucre. *Grindelia bracteosa* is not a close relative of the eradiate species of Arizona and New Mexico, *G. aphanactis* Rydb. In that species the heads are smaller, the involucre bracts are fewer, and the achenes are shorter, turgid, and truncate, all of which characters set it distinctly apart from the present species. In a recent account of the flora of the Santa Ana Canyon region (Madroño 1: 247,—1929), *G. bracteosa* was listed as "*Grindelia camporum* var."

CARTHAMUS TINCTORIUS L. Sometimes cultivated for its attrac-

tive saffron flowers and more especially for dyestuffs, this plant has been reported as a weed in fields at Bethany, San Joaquin Co., (Keithly in 1930). The plant is native to those parts of Asia and Africa bordering the Mediterranean Sea.

California Academy of Sciences, San Francisco.

TWO NEW CALIFORNIA PLANTS

HERBERT L. MASON

Linanthus peirsoni Mason, n. sp. Annual; stems many from the base, sparingly branched, wiry and filiform; leaves very minute, 1-3 mm. long, opposite, entire or palmately 3-lobed; inflorescence somewhat glomerate, the flowers sessile but appearing to be on slender pedicels because of the minuteness of the bracts; calyx deeply cleft, the lobes membranous-winged to the tip, ovate-lanceolate, sparsely ciliate within at the tip, 3 mm. long, 1.5 mm. wide, not exceeding the tube of the corolla; corolla 10-15 mm. long, rose-purple, throat golden-yellow below with a dark purple spot at the base of each petal; petals broadly ovate, somewhat truncate at the tip, margins erose to obscurely denticulate; stamens inserted near the base of the throat, equal in length, one-third the length of the corolla, filaments glabrous, anthers oval; pistils twice as long as the calyx, capsule slightly exceeding the calyx.

Southern San Diego County, California, to northern Lower California: on sandy terrain, 14 miles southeast of Tecate, Lower California, Frank W. Peirson 5844 type.

The above species is closely related to *Linanthus dianthiflorus* (Benth.) Greene, but is readily distinguished by the glabrous filaments and the very minute leaves as well as by the sessile flowers.

UTRICULARIA GIBBA L. Material of this species has recently been found in marshes on the delta of the San Joaquin River, near Holt, San Joaquin County, and is an interesting addition to the California flora. The plants do not differ in any appreciable way from those so common east of the Mississippi River. This species differs from the other California species in that the leaf segments are very few and often root-like, the flowers are only about one-half as large as those of the other California species, and the fruiting pedicels are erect. Collections: Holt, San Joaquin County, H. L. Mason no. 5420 (Herb. H. L. Mason); Holt, San Joaquin County, J. T. Howell no. 4411 (Herb. Cal. Acad. Sci.); Bogg's Lake, Mt. Hannah, el. 2500 ft., Lake County, J. W. Blankinship in 1928 (Herb. Cal. Acad. Sci.).

University of California, Berkeley.

NOTES AND NEWS

Dr. Carl B. Wolf who was on the Botany Department staff at Stanford University last year became resident botanist at the Rancho Santa Ana Botanic Garden in Orange Co. on September 1, 1930. From

June, 1927, until March, 1929, the position was held by Mr. J. T. Howell who is now Assistant in Botany at the California Academy of Sciences, San Francisco.

"Contributions to Western Botany, Number 16" was issued by Marcus E. Jones at Claremont, California, on Feb. 17, 1930. It consists of fifty-three pages of field notes, descriptions of new plants, and botanical observations.

On Sept. 3, 1930, number 17 of M. E. Jones' "Contributions to Western Botany" (pp. 1-31) was published giving the results of his field work during the preceding half-year as well as biographical sketches of Dr. George Engelmann and C. C. Parry, and numerous plant notes.

Dr. Eileen W. Erlanson outlines the results of "Field Observations on the Wild Roses of the Western United States" in "Papers of the Michigan Academy of Science and Letters," 11: 117—135,—1930. Much of the study treats with Californian species.

The following botanists from California attended the Fifth International Botanical Congress at Cambridge, England, in August, 1930: Dr. W. L. Jepson, Dr. T. H. Goodspeed and Prof. E. B. Babcock from the University of California, Berkeley; Miss Alice Eastwood, California Academy of Sciences, San Francisco; Dr. D. H. Campbell, Stanford University; Dr. O. L. Sponsler, Dr. C. C. Epling and Dr. F. Murray Scott of the University of California at Los Angeles; Dr. Herman Knoche and Dr. C. P. Smith, San Jose; Mr. Rimo Bacigalupi, Cambridge, Mass.

Picea engelmannii Engelm. was found September 3, 1930, at 3500 ft. altitude on French Creek, tributary to Scott Valley, by B. C. Goldsmith of the United States Forest Service. Mr. Goldsmith reports a single small tree, twenty feet high with a trunk ten inches in diameter; but probably other trees will be found as intimated by the discoverer. This is the second known station for this spruce in California. (Cf. Madroño 1: 116.)

The Rountrees of Carmel, California, have issued an excellent, well printed list of "California Wild Flower Seeds". The statement is made that no native plants or bulbs are offered for sale which are collected from native stands, an example in the way of conservation of the native flora which should be more widely followed than it is at present.—ELSIE M. ZEILE.

A "Moss Flora of Southeastern Washington and Adjacent Idaho" by George Neville Jones appeared in January (Research Studies of the State College of Washington 1: 113—192.—1930). The systematic part is preceded by notes on habitats, zonal distribution and collectors in the region.

THE BOTANICAL EXPLORERS OF CALIFORNIA.—VII.

WILLIS LINN JEPSON

Joseph Cook Nevin

About a half century ago J. C. Nevin discovered in the Tujunga Wash on the east side of the San Fernando Valley near Los Angeles a remarkable shrub. He sent material of it to Asa Gray who published it as new in the Synoptical Flora of North America (1:69)

under the name *Berberis Nevinii*. It is, doubtless, the rarest of all Californian shrubs as to number of individuals, and is today known from only two restricted stations, the one named above, the other being in the Arroyo Seco on the way to Devil's Gate where it was found by Frank W. Peirson.

Nevin spent his early life near Pittsburg, Pennsylvania, where he was born January 6, 1835. Educated to be a missionary, he was sent to China in 1859 where he remained for seventeen years, became a scholarly Chinese linguist and translated portions of the Bible into Chinese. These translations are still in use. In 1878 he returned to the United States and took up his residence in Los Angeles. It is said that he turned to botany as a relief from the strain imposed by the intense



(About 1912)

JOSEPH COOK NEVIN

study of the Chinese language. At any rate his activity attracted the attention of botanists and here in Los Angeles he was visited by Asa Gray and C. C. Parry. Among his botanical associates in Southern California were S. B. Parish, Daniel Cleveland and Anstruther Davidson. With his fellow townsman, W. S. Lyon, discoverer of the remarkable Catalina Ironwood (*Lyonothamnus floribundus* Gray), he became fast friends and together they made an excursion to San Clemente Island on which they spent four days in April, 1885, the first time it had been visited by botanists. Lyon and his companion were much excited over their finds on this unexplored island in the sea and Lyon, in high elation with their discoveries, wrote to E. L. Greene, "Nevin and I hot from Clemente" (Botanical Letters of Other Days, 101, 140, ms.). One of their new plants was named by Asa

Gray as *Eriophyllum Nevinii*, the foliage of which, says Mrs. Blanche Trask,² who studied it on Santa Catalina Island at a later date, gleams like frost work on the cliff-sides. Another discovery on San Clemente was *Gilia Nevinii* Gray.

From 1878 until his death on May 14, 1913, Dr. Nevin was a resident of Los Angeles and continued to collect new and notable plants, mostly very narrow endemics. Near the Hot Springs at San Juan Capistrano he gathered in October, 1881, a peculiar crassulaceous plant which Sereno Watson named *Cotyledon viscida* (Proc. Am. Acad. 17:372), and in the Santa Clara River Valley at Newhall he fell in with another striking species, to be called *Brickellia Nevinii* by Gray.

The language acquirements of Dr. Nevin should be noted. A graduate of Jefferson College at Cannonsburg, Pennsylvania, in 1854 and of the Allegheny Seminary in 1858, he knew Hebrew, Greek and Latin and possessed a fair reading knowledge of German, French and Spanish. He himself felt that if he had any strong natural aptitude it was for mathematics. On account of his linguistic attainments Westminster College in western Pennsylvania conferred on him the degree of Doctor of Laws about 1895. It was in about this same year that he presented to that institution his library and his herbarium of about two thousand specimens.

[For further details of his life see The United Presbyterian for July 24, 1913 and a biographical sketch by Fordyce Grinnell in the Bulletin of the Southern California Academy of Sciences, vol. 12, pp. 42-43,—1913. The portrait in this issue of Madroño was taken at his home in Los Angeles about 1912.]

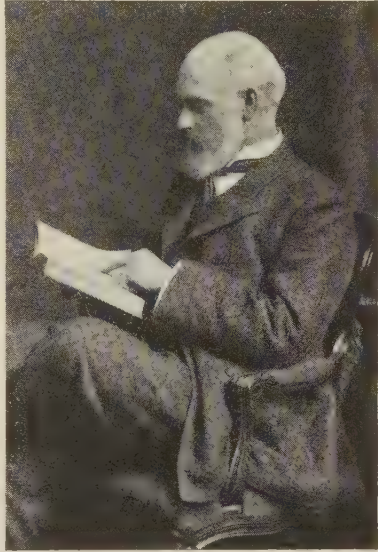
William Hillman Shockley

On the northeastern borders of Inyo County and southeastern Mono County, California, lies a desert range known as the White Mountains. It is a typical Great Basin or desert range and hence much like the north and south ranges in Nevada topographically. The culminating point in the range, White Mountain Peak, is the third highest point in California, so that in spite of a distant appearance of barrenness and monotony, the White Mountains have great interest in their native vegetation. The first botanical explorer to collect in them was William Hillman Shockley, a mining engineer, one of whose hobbies was botany. He resided at Candelaria, Nevada, from 1880 to 1893, and during this time made a number of excursions into the high parts of the White Mountains, as well as making many other collecting trips in western Nevada. Duplicates of his specimens were sent to the Gray Herbarium and a number of new species described from them. He discovered near Candelaria a new Composite which Asa Gray published as *Acamptopappus Shockleyi* (Proc.

² Erythea 7:139.

Am. Acad. 17:208). Sereno Watson named as new *Lupinus Shockleyi* (Proc. Am. Acad. 22:470), which Shockley collected at Soda Springs, Esmeralda County, and *Ivesia Shockleyi* (*Potentilla Shockleyi*) which he found at 13,000 feet, in the White Mountains. His collections, while not extremely extensive, were substantial and furnished many new facts regarding occurrence and distribution of species in the region. His herbarium is now at Berkeley.

W. H. Shockley was born at New Bedford, Massachusetts, September 18, 1855. He came of a sea-faring race, captains of whaling ships and the like, and traced back his ancestry to John Alden of the ship *Mayflower*. From such ancestors he may have obtained the lust of the Romany patteran, for, following his graduation from the Massachusetts Institute of Technology in 1875, he traveled over the earth in all continents and many lands in his capacity as a mining engineer. One of his colleagues in the Institute of Mining Engineers, H. Foster Bain, writes of him as one who, "while pioneering the West



WILLIAM HILLMAN SHOCKLEY

and carrying modern science down into the underground workings, found time to enjoy life and to think of other things than drills and stamp mills. Shockley was known to many of our members only as a persistent advocate of spelling reform; to others he stood as the explorer, familiar with all the odd corners of the world; to still others he was the careful accurate engineer; to those most fortunate he was known as the delightful companion familiar with the best in art, music and literature, a man with a rich mind well stocked by reading and wide experience, and as one of broad intelligent human interest."

In 1908 he married May Bradford, who testifies to his abiding interest in plants. "He was never separated from a botany press", she writes, and adds, "before we were married, when I traveled, some kind gentleman was always quite anxious to help me with the single suit-case I carried, but on my first journey with Mr. Shockley, not only did I have to carry my own suit-case but also the botany "jigger", for he always went equipped with his typewriter and four bags containing, among other things, dictionaries and books in Russian and Chinese, which he studied daily." It is interesting to note that he

kept a diary in which he made daily entries for a period of about fifty years.

The Shockleys went to Palo Alto to live in 1913, but later removed to Los Angeles where Mr. Shockley died May 26, 1925. [cf. biographies in "Engineering and Mining Journal", Aug. 14, 1920, p. 313, and "Engineering and Mining Journal-Press", vol. III, p. 1024, June 20, 1925.]

Charles Austin Stivers

Probably no two independent workers in botany would be likely to agree upon the specific limitations of any Californian species of



CHARLES AUSTIN STIVERS

the pages of early proceedings of the Cal. Acad. Sci.

Lupinus and their various forms with the exception of one species. That exception is *Lupinus Stiversi*, an annual of the higher foothills of the Sierra Nevada. With yellow banner and rose-pink wings it is a most beautiful species which is never mistaken by even the novice, nor confused with any other member of the genus. It was discovered by Lieutenant Charles Austin Stivers, U. S. A., at Summit Meadow on the Mariposa trail to Yosemite in or about the year 1862, and was named in his honor by Dr. Albert Kellogg (Proc. Cal. Acad. 2:192,—1862). Of Lieutenant Stivers little is known. He held the degree of Doctor of Medicine, and was at one time especially interested in the study of the marine algae. His name is mentioned occasionally in

Lucia A. Summers

For the first considerable plant collections made in San Luis Obispo County we are indebted to Lucia A. Summers. She was a native of Boston, Massachusetts, and married the Rev. R. W. Summers, an Episcopal clergyman, who was something of an ethnologist. They

lived in Oregon and Washington and finally from 1881 to 1898 in San Luis Obispo town, where Mr. Summers was rector of St. Stephens church. Here in this place they developed about their home a fine garden which was visited by many persons. Mrs. Summers collected the native plants of the region, especially around San Luis Obispo and Santa Margarita, and thus built up a local herbarium. Some interested person drew the attention of regent Phoebe Hearst of the University of California to the value of her herbarium, whereupon Mrs. Hearst purchased the collection and presented it to the University of California Herbarium. The specimens have in consequence often been cited in publications.

Mrs. Summers, aged fifty-nine years, died at Santa Cruz, December 27, 1898, surviving her husband only six months. During the period of her residence in San Luis Obispo she taught botany to the young people, and both she and her husband are still remembered as talented and cultured. One of her pupils, Mrs. Georgiana Parks Ballard, a charming woman of Paso Robles, has carried on amongst the people the work of preserving in the county an interest in the native plants. For most of the facts concerning Mrs. Summers I am indebted to Miss Ramona Reed of San Luis Obispo.

FOUR- AND FIVE-LEAVED CLUSTERS IN MONTEREY PINE

FERDINAND W. HAASIS

In the course of examinations in the fall of 1930 of the needles of a Monterey pine (*Pinus radiata* Don) standing on the grounds of the Coastal Laboratory at Carmel, California, it was observed that a few of the leaves were in fascicles of 4 instead of the customary 3 or rarer 2. Four such fascicles were noted, all situated near the end of the 1929 growth on the main stem about 2.5 m above the ground. None were observed on the 6 branches of the whorl at the base of this internode. Further observation disclosed the fact that 4-leaved fascicles were not uncommon on the trees in this vicinity, although they were not found on all of the trees examined. While 4-leaved fascicles were not seen on six somewhat smaller trees within a radius of 10 meters of the tree where the occurrence was first observed, yet altogether 9 different trees were noted with needles in 4's, these trees being separated from one another by a maximum distance of 46 meters.

The occurrence of 4-leaved fascicles in these trees is not restricted to any one calendar year, having been observed on various individuals on the growth of the years 1925, 1927, 1929, and 1930. Most of such clusters, however, were found on the 1929 internodes, with a considerable number on the 1925 growth in the case of the one tree where such old leaves were found persisting. In addition to these 4-leaved clusters, a few 5-leaved fascicles were also seen, mostly on the 1925 growth of the tree just mentioned.

Although the greater number of the 4-leaved clusters were noted on the main stem, sometimes on vigorously growing trees, but at other

times on overtopped trees, yet in a few cases they were observed also on lateral branches. Three-leaved clusters are apparently commoner on the Coastal Laboratory grounds than 2-leaved and, indeed, from the observations made, it seems that 4-leaved clusters are more numerous here than 2-leaved. In the case of one 1.4-m tree needles were found in clusters of 3, of 4, and of 5, and in addition there were a few isolated long leaves of the primary type.

The occurrence of 4-leaved or 5-leaved fascicles in Monterey pine is not mentioned as a possibility by Sudworth,¹ Jepson,² Sargent,³ or Abrams,⁴ although 4-leaved clusters are not unknown in other American species of the genus, and are in some cases normal. Five-leaved clusters, also, have been reported for one or two pitch pine species. Sudworth, for example, mentions 4- and 5-needled clusters in *Pinus ponderosa* Laws., which usually has 3- or (according to Sargent) sometimes 2-needled clusters.

It appears that the occurrence of 4- and 5-leaved fascicles has not been previously reported for Monterey pine. And furthermore, 4-leaved clusters seem to be relatively rare among the pines of the United States. From the fact, however, that such a condition has been observed in the case of another normally 3- and 2-needled pine it is not entirely surprising that it should be found in this species. Still, it is to be borne in mind that the range of *P. ponderosa* is far more extensive than that of *P. radiata* and greater variation would accordingly be expected in the former species.

Carnegie Institute of Washington, September 4, 1931.

BIOGRAPHICAL NOTICE OF IDA MAY BLOCHMAN

ETHEL K. CRUM

Ida May Twitchell was born April 11, 1854 at Bangor, Maine. She resided in Iowa from 1857 to 1880, and in 1878 graduated with high honors from the State College at Ames. In 1880 she removed to Santa Maria, California, where she taught first in the elementary schools, later, from 1896 to 1909 in the Santa Maria Union High School. Her marriage to Lazar F. Blochman took place at Santa Maria in 1888. Mrs. Blochman's death occurred August 1, 1931 at Berkeley of which she had been a resident since 1909.

For botany, which was her favorite subject at college, Mrs. Blochman retained a keen and life-long interest. In 1893 she sent a series of articles on the native economic plants to *Erythea* which the youthful editor captioned under the title "California Herb Lore." Another series on "The Wild Flowers of California" appeared in 1896 in "El

¹Sudworth, G. B. Forest trees of the Pacific Slope. U. S. Dept. of Agr. Forest Service, 1908.

²Jepson, W. L. *Silva of California*. Memoirs of the Univ. of California, vol. 2, 1910; *ibid.* Manual of the flowering plants of California. Berkeley, Calif. 1923, 1925.

³Sargent, C. S. Manual of the trees of North America. Boston, Mass. 1922.

⁴Abrams, L. Illustrated flora of the Pacific States, vol. 1, 1923.

Barbareño" published at Santa Barbara. Her botanical collection of 600 numbers of native plants from northern Santa Barbara County was exhibited at the World's Fair in Chicago in 1893 and is now the property of Northwestern University. She sent a number of plants from her region to Professor E. L. Greene of the University of California who named for her as new *Senecio Blochmanae* collected along the Santa Maria River (*Erythea* 1:7,—1893). For many years Mrs. Blochman was a member of the California Botanical Society. Her paper on "The Medicinal Uses of Native Plants by California Indians," a subject which claimed much of her interest during recent years, was read before the Society February 23, 1929. As head of the wild flower section of the College Woman's Club of Berkeley, Mrs. Blochman for several years conducted weekly classes in botany and was in charge of the annual wild flower exhibit.

In addition to her scientific interests Mrs. Blochman was closely associated with civic and educational affairs both in Santa Maria and, later, in Berkeley. She was for nineteen years president of the Berkeley Charity Commission, and for eight years a member of the Berkeley Board of Education. With the intellectual alertness so ably devoted to community and scientific work, Mrs. Blochman combined versatility, sincerity and personal charm which will long be remembered by her many friends.

OPEN LETTERS

Cupressus macnabiana.

The enclosed specimen was collected by Ranger W. Brokenshire in sec. 5, township 27 n., range 3 east, near the Mill Creek rim, eastern Tehama County. I believe it to be *Cupressus macnabiana* var. *bakeri* according to your description. We have several "islands" of McNab Cypress scattered throughout the forest but this specimen is from an area at least twenty miles from the nearest island.—C. S. Robinson, Susanville, Dec. 8, 1930.

Cupressus bakeri has more slender branchlets than in your specimen of *Cupressus* from Mill Creek rim by W. Brokenshire. *C. bakeri*, too, has very small cones with slender reduced horns. The bark of *C. bakeri* is scaly or flaky and reveals a bright cherry-red underbark. The bark in your specimen is roughly fissured and dark brown. The Mill Creek specimen is, I think, rather nearer *Cupressus macnabiana* of the Coast Ranges than it is to specimens of that species from other stations in the Sierra Nevada that I know.

There has now been received your map, showing known locations of "islands" of *Cupressus macnabiana* in the Lassen Forest, namely, 1. West of Burney Spring $3\frac{1}{2}$ miles, at 5200 feet. 2. West of Tamarack Peak $1\frac{1}{2}$ miles at 6200 feet. 3. Mill Creek rim at 2000 feet. 4. Near Magalia, 4000 feet. The above order of stations is from north to south.—W. L. JEPSON.

NOTES AND NEWS

Mrs. Ynes Mexia, a member of this Society, who for the past two years has been collecting Brazilian plants for distribution, is now en route up the Amazon River to the eastern Andes in Peru where she will continue her botanical explorations.

Mr. and Mrs. J. C. Clemens called at the University of California herbarium in July. They were en route to Borneo, where under the auspices of the British Museum they will make an extensive collection of the native flora.

Dr. C. R. Ball, a *Salix* specialist, who has been in California since January, 1931, has discovered one willow species new to California, namely *Salix nivalis* on Mt. Dana.

Dr. F. W. Pennell, Curator of Plants at the Philadelphia Academy of Natural Science, and Dr. E. T. Wherry of the United States Department of Agriculture, collected *Scrophulariaceae* and *Polemoniaceae* in Oregon during July. California, we understand, will be visited later with a similar purpose.

Dr. P. A. Munz, Professor of Botany at Pomona College, Claremont, California, is absent on sabbatical leave. He will spend a considerable portion of time at Kew in research preparatory to a forthcoming publication. During Dr. Munz's absence, Dr. Leo Hitchcock of the Missouri Botanical Garden will be in charge at Pomona.

Mr. H. L. Mason, Associate in Botany at the University of California has returned from a four month's voyage to Alaska with the United States Coast Guard vessel *Northland*. One objective of the trip, which was in the interests of paleobotany, was to secure fossils of *Sequoia* from the deposits at St. Lawrence Island; another, to establish if possible, a connection between the Pleistocene and Pliocene floras of North America and Asia. The expedition made stops at Norton Sound, Point Barrows, St. Lawrence Island, Dutch Harbor, Unalaska, and at various other points along the Alaskan coast.

Dr. W. A. Setchell, of the University of California, and Mrs. Setchell, were occupied from June 22 to July 4 in "willow hunting" in Alaska. They returned with about 270 numbers of *Salix* from the south coastal and McKinley Park regions, a collection which has extended notably the ranges of several Alaskan species.

Mr. O. H. Seaholm, a member of this Society, died May 10. He lived at Fort Bragg and took much pains to promote interest in the local flora in the schools at that place. He also discovered a few novelties in Mendocino County.

BOLANDER'S RED MOUNTAIN AND EUREKA TRAIL

CARL PURDY

Some years ago Mr. A. J. Johnson of Astoria, Oregon, a notable collector of trees and bulbs, while in southwestern Oregon came across what is now known as *Lilium Bolanderi* in flower and took fresh flowers of this lily to Dr. H. N. Bolander, then a very old man teaching botany in Bishop Scott's Academy at Portland, Oregon. Dr. Bolander said immediately that it must be a new lily and that he had never seen it. On looking up the matter he found that it was undoubtedly the *Lilium Bolanderi* that Sereno Watson had described and had named after him as its discoverer. In Dr. Watson's notes reference is made to material sent to him earlier by Dr. Bolander although the fresh material from which the description had been made was from Thomas Howell.

Hearing of this from Mr. Johnson I was lead to correspond with Dr. Bolander and to hear from him exactly what route he had taken when going to "Red Mountain". The letter has long since been lost but here are the facts. Dr. Bolander, leaving Weaverville, Trinity County, took trails through the mountains to the Hupa Valley in northern Humboldt County, California; thence along the regular trail to Arcata, going over what is known as Bald Mountain. The "Red Mountain" of his early notes should have been Red Hills and they are the red hills of the Hupa region. Dr. Bolander was never near Red Mountain in northern Mendocino County to which much of his material has been referred. A number of plants which he collected and which belong farther north can be found in certain swamps on Bald Mountain.

The material which Dr. Bolander sent to Watson and which was confused with Mr. Howell's material in naming *Lilium Bolanderi* was unquestionably *Lilium Kelloggii* which is found on the route that he took. When later I rediscovered that lily I named it after Dr. Kellogg as it was then too late to give Dr. Bolander credit.

The Terraces, Ukiah, Dec, 5, 1930.

Bolander's Mendocino and Humboldt trips.—Bolander's field book shows that, in June, 1867, he made a collecting trip from Cloverdale to Ukiah, Long Valley, mouth of the Mattole River in Humboldt County, thence down the coast to Noyo, Mendocino City and Anderson Valley. On this trip, amongst many other stations he cites "Red Mt.," "Humboldt Co.," many times. He also uses the place names Bear Harbor; Shelter Cove; Elk Ridge; Big Flat (Humboldt Co.); Parker's sta., Eureka trail; East Fork of Eel River at Wood's ranch; Red Mts., Mattole district; and so on.

No other botanist in California has anything like so detailed a knowledge of the distribution of the Californian species of *Lilium* as Mr. Purdy. His judgment, therefore, in any question of this kind

is of an expert character and carries the greatest weight. It is certain, however, that he would never have destroyed the Bolander letter and we may hope that some day it will be turned up from his files. There was no one at that time, other than Mr. Purdy, forethoughtful enough to secure the direct evidence from Dr. Bolander himself. Bolander made other trips into Mendocino County in earlier years but the one noted seems the more significant with reference to Red Mt.—W. L. JEPSON.

BIOGRAPHICAL SKETCH OF PATRICK BEVERIDGE KENNEDY¹

WILLIS LINN JEPSON

Throughout his life Patrick Beveridge Kennedy followed the profession of agronomist and it might well be said in his case that he came fittingly by his work since for three generations in the male



1927

PATRICK BEVERIDGE KENNEDY

line his ancestors had been given to matters horticultural. His great-grandfather, John Kennedy, was of a firm of London nurserymen and landscape-gardeners and the author of two volumes on horticulture published in 1771. His grandfather, Lewis Kennedy, was a well known landscape architect in his day and a joint author of two volumes on the Tenancy of Land, while his father, George Penrose Kennedy, as an architect was the designer of many renowned places and grounds in Scotland. He himself was born at Mt. Vernon, near Glasgow, Scotland, June 17, 1874. His early schooling was had in Scotland and England but he later attended the Ontario Agricultural College in Canada and took his bachelor's degree at the University of Toronto in 1894. In 1899 he secured his

Doctor of Philosophy degree from Cornell University, where he was under the special tutelage of Professor W. W. Rowlee. For the academic year 1895-1896 he was assistant in chemistry at Ontario Agricultural College and went in 1899 as an assistant in the division of agrostology to the United States Department of Agriculture. In 1900 he was appointed Associate Professor of Botany and Entomology in the University of Nevada and in 1904, Professor of Botany, Horticulture and Forestry in charge of the department. In 1913 he left

¹To the Botanical Society of America publications the writer has contributed a memorial paper on Dr. Kennedy, part of which is used here.

the University of Nevada to become Assistant Professor of Agronomy in the University of California at Berkeley, where he remained until his death on January 18, 1930, being successively promoted meanwhile to the rank of Associate Professor and finally, full Professor.

During his entire professional life every day duties involved him in practical problems relating to the farm and to the range. To the solution of these problems he brought not merely a good scientific training but a scientific attitude that was vigorous and searching. The results of many of these pieces of work appeared in the form of printed publications, usually consisting of only a few pages, but representing not less than sixty titles. During the rapid development of agricultural colleges provision has been made for subjects that are considered practical or fundamental, but often little or no support has been given to the subject of botany. And yet in an agricultural college, sometimes in all divisions of it, botanical work arises daily, frequently in considerable amount. In consequence, Dr. Kennedy felt called upon to do a great amount of routine which was referred to him, the flow of which never stopped, but rather increased on account of the rapid expansion that was taking place in the institutions with which he was connected. Perhaps we may say that he was, as it were, penalized for his botanical knowledge, that it was as the result of these conditions that his research projects were handicapped for lack of time.

About 1900 he had begun a broad piece of research upon the genus *Trifolium*. For a period of thirty years he gave to this project such free hours as could be spared and the problem was well in hand at the time of his sudden death. His ideals of research work were, however, so thoroughgoing that nothing less than complete relief from daily routine would, in all probability, have permitted its completion.

In the activities of the California Botanical Society, especially in that part of it which had to do with the popular diffusion of botanical knowledge, Dr. Kennedy always took a leading part. In August, 1915, he was elected President of the Society and for two and one-half years faithfully and efficiently directed the Society's life during a period when his services were of the first importance in the continuity of its work. Out of gratitude, the Society remembers and pays homage to his goodwill, to his friendliness and geniality, and to his capacity for understanding his fellow men.

Berkeley, November 16, 1930.

RECORDS OF PLANTS NEW TO CALIFORNIA

DORIS KILDALE GILLESPIE

During the past three years, while making a botanical survey of the Siskiyou Mountains and adjacent regions of northern California and southern Oregon, the writer has collected several species of western plants apparently heretofore not credited to the flora of California. It is with the hope that such records will prove of interest to California botanists that these seven species are listed below. All the specimens cited may be found in the Dudley Herbarium of Stanford University.

ABIES LASIOCARPA (Hook.) Nutt. Collected in the Salmon Mountains at Hancock Lake, north side of the divide between the head of the North Fork of the Salmon River and the head of Hancock Creek, on the trail to Marble Mountain, Siskiyou County, growing in granite at the border of a glacial lake, elevation 7000 feet, Aug. 19, 1928. Associated with *Picea breweriana* S. Wats., *Tsuga mertensiana* (Bong.) Sarg., and *Pinus monticola* Dougl. Collectors Roxana S. Ferris and Doris K. Kildale (Kildale no. 6554). Although the Alpine Fir has been known from the southern Cascades in Oregon where it was collected at its southernmost station 10 miles south of Crater Lake by Elmer I. Applegate, the species has previously not been known from California.

SAXIFRAGA BONGARDI Presl. Collected on the southeast spur of Preston Peak, Siskiyou County, California, growing in crevices in granite at an elevation of 6500 feet, July 20, 1929, by Doris K. Kildale (no. 8591). The next most southerly station for this plant is near the Oregon Caves, Josephine County, Oregon, where it was collected by Dr. Morton Peck of Williamette University. The species is common on the higher peaks of the Oregon Cascades.

PINGUICULA VULGARIS L. Collected on a wet serpentine cliff under a winter waterfall along Smith River, near Douglas Park, Del Norte County, April 21, 1929, by Doris K. Kildale (no. 7341). This species of old world distribution is common along the Pacific Coast from Alaska to Washington, also being reported from Oregon by Thomas Howell.

EURYPTERA HOWELLII (Wats.) C. & R. Discovered in the Siskiyou Mountains on the trail up the South Fork of Indian Creek between Happy Camp and Elk Lick, Siskiyou County, elevation 2400 feet, growing in open woods in rocky soil. Collected by Doris K. Kildale (no. 8640), July 20, 1929. Representing one of the many endemic plants of the Siskiyou Mountains, the species has been found before near Waldo and Wimer in Josephine and Jackson counties of Oregon.

ANTENNARIA RACEMOSA Hook. Collected on the southeast spur of Preston Peak, Siskiyou County, California, growing in rock crevices at an elevation of 6500 feet, July 20, 1929, by Doris K. Kildale (no. 8588). Previously, the most southern station known was Grayback Mountain, Josephine County, Oregon, according to the collection of C. V. Piper.

LYCOPodium INUNDATUM L. Collected in sphagnum bog in swale at the southwest end of Big Lagoon, Humboldt County, elevation 20 feet, Feb. 3, 1929, by Doris K. Kildale (no. 6881). The plant forms dense mats and is often submerged. The nearest locality of the same species is in Coos County, Oregon.

JUNCUS REGELII Buch. Collected at Raspberry Lake, head of the South Fork of Indian Creek, Siskiyou County, elevation 6000 feet, July 20, 1929, by Doris K. Kildale (no. 8705). *Juncus regelii* has been collected in the Cascade Mountains of northern Oregon, but has not been known any farther south.

Gray Herbarium, Harvard University, April 7, 1931.

THE SAN LORENZO LAUREL

FREDERICK ALVIN MEYER

For many years the great California Laurel (*Umbellularia californica* Nutt.) of the Russian River, near Cloverdale, has been the largest tree of its species on public record. There is a much greater laurel, however, heretofore unknown both to botanists and to the thousands of people who daily pass within half a mile of it. Its measurements indicate that the Cloverdale tree must take second place in regard to size. This laurel stands on the eastern outskirts of the village of San Lorenzo, Alameda County.

The dimensions of this tree are interesting and impressive. The trunk, as often in other large trees of this species, has an enormous flare near the base. At the ground, the circumference of the trunk is exactly forty-nine feet. Four feet above the ground where the trunk is smallest, it measures twenty-eight feet and four inches in girth. Between four and eight feet from the ground the main stem gives way to five huge branches, the largest two of which each measure fourteen feet in circumference, making these limbs very nearly as large as the trunk of the Cloverdale Laurel.

The San Lorenzo tree is seventy feet high, and eighty-five feet in crown diameter. The obvious disproportion between the dimensions of the trunk and of the crown find explanation in a disastrous event in the tree's life which took place about thirty-five years ago. A huge limb, weakened, no doubt, by age and great weight, had broken from its place and crashed to the ground. The little lady who then owned the property, fearful that the weight and spread of the limbs would cause the tree to split apart, and, perhaps, crush her little frame house, sought to find a man who would remove some of the most menacing branches. As a result, but quite contrary to her intentions, all that remained of the great tree was an immense trunk, dividing into five huge branches that terminated abruptly about twenty feet from the ground. Because of this unfortunate event, the upper part of the tree's present crown is formed entirely by very long and slender branches, none of which exceeds one foot in diameter; from their lower sides hang long, cord-like branchlets that sweep the ground in a circle about the trunk. Undoubtedly, the crown was formerly much larger.

At present, the tree is about seventy-five feet north of the bank of San Lorenzo Creek and about twice that distance from the main channel of that stream; but in time past, due to the stream's shifting in flood season, the tree was much nearer the creek. The first white man who lived in that vicinity used to tell about passing along the road that followed the stream bank, and stopping to eat his lunch beneath the friendly branches of the great laurel. In the side of the trunk toward the stream, there was once a great cavity, large enough to admit several children or crouching adults within the tree. Its interior was charred, and old Spanish coins have been found outside, beneath the tree. It is a tale of the tree's owner, who used the hollow

for a playhouse when she was a child, that it was in former years a place where Indians met and gambled; and that they, perhaps, built fires there, causing its charred condition. As late as ten years ago, the entrance to the hollow was still large enough to admit a small person. At the present time the bark has so nearly covered the cavity that it is impossible for one to insert the hand, where once a man could enter.

The reason that this great tree has been so long unknown to the general public lies in the fact that it stands in the grounds of a private residence (at 624 Lewelling Road, formerly called Main Street) and its trunk cannot be seen from the main road. The crown can be seen for a considerable distance; but there are other trees in the immediate vicinity, and the laurel attracts no attention until one has entered the yard in which it stands, and is in view of its great trunk. The house beneath the tree was built in 1864.

Oakland, July 15, 1931

A VARIANT OF THE COAST LIVE OAK

JOHN THOMAS HOWELL

AN OLD NAME RECONSIDERED. In the late autumn of 1851 the members of the Sitgreaves exploring expedition to southwestern United States crossed the Salton Sink of the Colorado Desert on their route to San Diego and the Pacific, and, passing beyond San Felipe, ascended the western mountains. The summits of these, according to Dr. S. W. Woodhouse, surgeon and naturalist to the expedition, were covered with tall pines, and on the dividing ridge was found and collected a species of live-oak (Report of an Expedition down the Zuñi and Colorado Rivers, 40,—1853). Together with the other botanical collections, specimens of this oak passed to Dr. John Torrey for study and in his report on the botany of the expedition he described as new this tree from Santa Ysabel and named it *Quercus oxyadenia* (loc. cit., 172, pl. 17). And thus it was that that form of *Q. agrifolia* inhabiting the higher slopes and canyons of eastern San Diego Co. became known in botany; but ever since its first publication the name has never been used and it has long been relegated to synonymy under *Q. agrifolia*.

Although *Q. oxyadenia* is probably too near *Q. agrifolia* to be tenable as a species, the Torrey oak has been noted on several occasions in the field as a well marked form deserving at least varietal recognition. The shape and size of leaves and acorns, which were the distinguishing characters according to Torrey, fall well within the specific bounds of variation in *Q. agrifolia*, but the dense and persistent pubescence which entirely covers the lower side of leaves, petioles, and branchlets is not found in any other form of that species. Because of the distinctive nature of this character and its variance from the normal type, the Torrey oak is here designated *Q. agrifolia* var. *oxyadenia* (Torr.) J. T. Howell, comb. nov.

This variety is typically developed in the high valleys and canyon

bottoms of the mountains on the western edge of the Colorado Desert ranging from the San Jacinto Mts. in Riverside Co., California, southward through San Diego Co. to the mountains of northern Lower California. The pubescence which marks this variant is stellate in character (as is usual in the genus) and forms a felt-like covering on branchlets, petioles, and lower sides of leaves. This dense and uniform pubescence is remarkably persistent, for leaves three years old are frequently as densely hairy beneath as the lower surfaces of leaves of the current season. Along the western bounds of its distribution intergrades are to be found between var. *oxyadenia* and the type of *Q. agrifolia* with glabrous or very sparsely stellate-pubescent leaves which is common in the lower hills and valleys of southern California. These intermediates are marked by noticeably stellate-pubescent leaves and branchlets but the hairs are neither so numerous nor so persistent as in var. *oxyadenia*. Thus on hillsides at the Henshaw Dam on the San Luis Rey River typical specimens of var. *oxyadenia* were collected (J. T. Howell no. 4844), in the canyon of the San Luis Rey 6 miles west of Henshaw Dam (J. T. Howell no. 4853) a specimen intermediate in character was collected, while at Pala Summit still further west the form of *Q. agrifolia* usual at low altitudes in southern California was seen. Other collections are: "mountains between El Centro and San Diego", E. A. Zemczuk in 1929; dry valley bottom, 12 miles south of Warner's Hot Springs, San Diego Co., J. T. Howell no. 3264; common along washes, Vandeventer Flat, San Jacinto Mts., Riverside Co., Munz no. 5955 (Herb. Univ. Calif.); Santa Cruz Creek, Lower California, T. S. Brandegee in 1893 (at least as to branchlet just below the sheet-number 119133, Herb. Univ. Calif.); 15 to 20 miles east of Ensenada on road to Ojos Negros, Lower California, Wiggins and Gillespie no. 4053 (intergrade to *Q. agrifolia*, Herb. Calif. Acad. Sci.)¹.

THE ANNUAL DINNER FOR 1931

The annual dinner meeting of the California Botanical Society was held in the Rockefeller International House, University of California, Berkeley, on the evening of March 7, 1931. Doctor George J. Peirce of Stanford University, President of the Society, presided as toastmaster. During the course of the dinner musical numbers were presented under the direction of Mr. W. W. Carruth. A notice of the life and work of Dr. P. B. Kennedy, a former president of the Society, written by Dr. W. L. Jepson, was read in Dr. Jepson's absence by Dr. Peirce. There was also read by Professor H. E. Mc-Minn an interesting excerpt from one of Mrs. Ynes Mexia's letters written while botanizing in the tropical forests of Brazil. Following the dinner, Dr. Carlton R. Ball, gave the principal address of the evening on "Some Interesting Facts about Willows." In connection

¹ Unless otherwise noted, the specimens cited are in the herbarium of the California Academy of Sciences.

with his lecture he exhibited herbarium specimens of rare and interesting willows which grow in California. Doctor Ball is at the University of California this year as Research Associate in a Survey of Agricultural Activities, Bureau of Public Administration, Department of Political Science.

Mention of the proposed incorporation of the Society formed a feature of the programme and announcements made by Dr. Peirce were received with interest. He spoke on the advantages and the desirability of incorporation and named a committee to make the necessary arrangements for the change of the present Society to one having legal rights and legal coherency.

The arrangements for the evening were made by the dinner committee, Mr. H. L. Mason, chairman, Mr. H. E. McMinn, and Miss Lucile Roush. The floral decorations of budding *Salix*, fruiting *Equisetum*, and starry-flowered *Veratrum* provided by the committee were enhanced by the addition of some rare and beautiful types of *Arctostaphylos* and *Ceanothus* brought from the vicinity of Santa Rosa by Mr. Milo S. Baker.—JOHN THOMAS HOWELL.

NOTES AND NEWS

Professor A. C. Noé of the Department of Palaeontology, University of Chicago, lectured September 22 at the University of California on his investigations of the floras of the coal measures of Illinois.

Under the title "Important Browse Plants" the United States Department of Agriculture has issued a paper (Misc. Publ. 101) by W. A. Dayton as valuable as it is interesting on browse shrubs and woody plants. It is illustrated by 45 figures, and contains 213 pages and a bibliography.

The most recent issue of "Contributions from the Dudley Herbarium" of Stanford University is a systematic paper of 170 pages by G. T. Benson on "The trees and shrubs of western Oregon". Dr. LeRoy Abrams contributes a foreword on the fair promise of the young author who died April 16, 1928.

On July 25 Miss Alice Eastwood, Curator of the Herbarium, California Academy of Sciences, was struck by an automobile in San Francisco. She was badly bruised and a bone in her left knee was broken. The injuries are being auspiciously mended in a San Francisco hospital. Undoubtedly Miss Eastwood's courage and high spirits will aid in hastening complete recovery.—W. L. J.

Mr. John Thomas Howell, Associate Curator of the California Academy of Sciences Herbarium, has returned from a collecting trip to Oregon, Washington and Vancouver Island, thence east to Calgary, in the company of Mr. and Mrs. Clarence Elliott of Stavenage, England. He collected over 1500 specimens of vascular plants, besides many mosses and liverworts.

SOUTHWARD EXTENSION OF RANGE OF
ARBUTUS MENZIESII

CARL V. MEYER

Arbutus Menziesii, which covers a geographical range from British Columbia to southern California, where it is found locally, has been known for some time to occur in San Diego County. A record of two trees growing in a remote cañon near Nellie on Palomar Mountain, with specimens from one of them, collected in the year 1905, is to be found in the University of California Herbarium at Berkeley. An extension of the range of this species, now the southernmost known locality, not recorded hitherto, is to be noted in the occurrence of a great many madroños, several hundred in number, on Roderick Mountain some miles to the south and a shorter distance to the west of Palomar Mountain.

Roderick Mountain, located twenty-seven miles from the coast, the highest of a group of rugged mountains through which the cañon of the San Luis Rey River passes before emerging upon the valley floor near Rincon, rises to a height of 3800 feet. A long rather even northwest slope, with an extensive rock ledge rising several hundred feet in height on its west end, the base of the outcropping being on an average about 3000 feet in altitude, makes for a cooler, more humid spot, which is more favorable for this species than is usually found in southern California. The average seasonal rainfall of this area is probably around thirty inches; and it is not unlikely that summer fogs contribute toward making this a spot well adapted for our native *Arbutus*.

On this slope growing at an altitude of 2000 to 3000 feet, are a number of clumps and patches of madroños. The largest of these are found near the base of the rock ledge mentioned, and in the larger ravines of the slope, smaller clumps of smaller trees being scattered in the chaparral. The madroños of this area are all stump sprouts, as far as I have observed; the region has evidently been burned over repeatedly. A number of trees arise from each stump forming rounded clumps, the individual trees of which are slender in form. The trees I saw near at hand ranged from mere saplings to trees about thirty-five feet high, with trunks up to ten inches in diameter at the base: but I was unable to get to the more centrally located groups in which the trees may well be forty to fifty feet high, judging from afar, comparing them with the trees seen near at hand. Indications are that much larger madroños grew here at an earlier time, the size of some of the stumps suggesting a possible diameter of two feet. The remains of the previous generation of trees are to be found in places: the trunks of these approximate those now standing.

The slope on which the madroños grow is covered with a dense tall chaparral which is composed of species quite typical of this general region. California oaks (*Quercus agrifolia*) grow in close association with the madroños, being abundant in the ravines and

valleys of the slope. Black cottonwood (*Populus trichocarpa*), and western sycamore (*Platanus racemosa*) are found in the larger ravines. A single tree of *Libocedrus decurrens* was discovered growing in a ravine at an altitude of about 2000 feet. No other coniferous trees are to be found on Roderick Mountain, as far as I know; Bigcone Spruce (*Pseudotsuga macrocarpa*) grows a mile or two farther east on rocky out-croppings on the same side of the river.

My attention was called to the madroños of this locality by descriptions of "manzanita trees" said to be growing there by persons well acquainted with the region. Three trips were taken to the locality. The first, on January 1, 1931, was fruitful in the discovery of a single madroño (from which I took leaf specimens) and in catching sight of the larger groups of these trees growing high on the slope. Desirous of reaching these more extensive groups of larger trees I made a second trip on March 10. Although my objective was not attained, due to the density of the chaparral, I succeeded in reaching the patch of madroños growing high on the west end of the slope, and the uppermost in the ravine below it. It was gratifying to find the madroños blooming profusely at this time. In order to get a more general idea of the distribution of the madroños growing here, a third trip was taken by climbing a hill to the north of Roderick Mountain, from which an unobstructed view may be had of the whole extent of the northwest slope. The clumps of madroños, although a half mile or more away, were easily distinguishable from the rest of the vegetation, which, incidentally, was remarkably green for midsummer, by now July 30. The madroños in the more favorably located spots were in perfect condition at this time, but some of the trees in the drier locations showed evidence of drought.

October 12, 1931.

THE ROAD TO CIMA

MARY BEAL

There were four of us that started from Barstow on May 22, 1931, for a trip to Cima in the eastern Mohave Desert near the Providence Mountains. Miss A. L. Waterman, Mr. Irving Scott Jr., Mr. Herbert Manson and myself. It was a wonderful trip for scenery and a treat, even if we had not seen a flower. All of us were fascinated by the country and one of the delights was the surprise of it. We hadn't expected anything like it. About ten miles beyond Cronese Valley we came upon smoke trees¹—many of them, in a wash leading from the mountains into Soda Lake basin. They are full of buds and I saw a few flashes of violet, but only a few. We want very much to go down in a week or so to see them in bloom. On the long climb from Baker to Halloran Springs and on to the summit we found

¹ *Parosela spinosa* Hel. (W.L.J.).

² Yucca Grove station, about 2 miles easterly from Halloran Springs, where the road crosses the southerly extension of the Shadow Mountains (W.L.J.).

flowers, *Stanleya pinnata*, *Mirabilis Froebelli* (bright purple), *Petalonyx*, *Hugelia*, *Chaenactis*, *Isomeris arborea* in pod; and the creosote³ bushes were so green and large, in full bloom. In the joshua forest beyond Halloran Springs we found beautiful plants of *Baileya multiradiata*, 18 inches high and over, with clear yellow blooms from an inch to an inch and three-quarters across. There were other lovely things of which I caught sight and intended to get as we returned but it was too late. We hadn't half time enough. On the other side of the summit and on the Cima road for a few miles we found good specimens of *Psilostrophe*, the first I had ever seen. Near there I found the pleniradiata variety of *Baileya multiradiata*, the species being our common one around Barstow. From the summit to Cima we met many new things: first of all we marveled at the joshua forest, the largest⁴ we had ever found in the desert—at least 12 miles in length and several miles wide—I believe eight or ten miles in places, and I think it joins the forest that stretches from the summit to a few miles above Halloran Springs. The one thing most noticeable about it was the habit of growth, the trees did not spread out their branches and make bushy trees like Mr. Hemis's "apple orchard" at Coolgardie,⁵ at least few of them did. Their branches are strongly ascending. It interested us much. We found a number of clumps of *Cereus Mojavensis*, one of 100 or more stems, in bloom. The only place I have found them before is at Ord Mountain between the camp and the spring. We also found grizzly bear cactus (*Opuntia ursina*) in bloom, no large clumps as at Ord, but a few scattered smaller ones. Then we found *Mammillaria* in bloom—not the fish-hook, but *M. deserti* and *M. Alversonii*.

We saw a few *Opuntia Mojavensis* and many of cholla-like growth with longer joints, which seemed to fit in no exact species in the Manual. I found *Leucelene ericoides* in the forest, my first acquaint-

³ *Larrea tridentata* var. *glutinosa* Jepson (W.L.J.).

⁴ *Yucca brevifolia* Engelm. (W.L.J.).

⁵ The Joshua Forest about Cima.—This is a very remarkable forest and doubtless the largest in California. The great desert valley which lies between the southerly extension of the Shadow Mountains and the Ivanpah Mountains is filled from side to side with it. Thence it extends westerly over the ridge to Halloran Springs, easterly over the pass by Kessler Peak into the Ivanpah Valley about Cima. East of Yucca Grove station, one leaves the main road at Windmill road station on the broad valley floor and turns southerly. One now begins to get an increasingly impressive idea of the vastness of this yucca forest as he goes on. The slope ascends almost imperceptibly until one attains a summit between two peaks, Kessler Peak on the left, a prominent point in Ivanpah Mountains, and Teutonia Peak to the right. On the downward slope, easterly, into the Ivanpah Valley, the yucca trees are denser than I have ever seen them elsewhere—as one looks through the forest along the slope the trunks finally close the view, filling completely the vista. Everywhere else I have been able to look quite through a yucca forest to a further background. In the Ivanpah Valley the forest extends for a long distance north and south. Its limits have not as yet been defined.—W. L. JEPSON.

⁶ A reference to the grove of very remarkable and large trees of this species on the Coolgardie yucca mesa in the Calico Mountains (W.L.J.).

tance with it, and a few orange mariposas (*Calochortus Kennedyi*), we so often see at Ord or around Hesperia, Oro Grande or Adelanto. I wanted more time there and I wanted to have time to go on beyond Cima on the road to Fenner, where we heard there were quantities of flowers only a few miles farther, but it was too late; we reached home quite late as it was. They had two to five inches of rain in that section a week or so ago, and it is reported full of bloom. That country is very interesting, high and rugged, with splendid mountain ranges all about. We all felt that we would like to explore it thoroughly. We saw many yuccas—one of which was still in bloom—*Yucca baccata*, and a few plants of *Agave Utahensis*, or what I took to be that, with barbed leaves, two individuals of which were in bloom near the summit road station, tall spikes of slender yellow flowers. We saw the loveliest color in bladder sage (*Salazaria Mexicana*) that I ever beheld—quantities of it that were a mass of opalescent jewels, a heavenly lavender and mauve, some more pink in hue, a rosy mauve, that fairly took one's breath.

Barstow, May 24, 1931.

We made the Cima trip again and I located the whereabouts of *Agave Utahensis* on Clark Mountain and the barrel cactus, but had no time to verify the field naming. The smoke trees (*Parosela spinosa*) are just getting into their swing, some quite lovely with a violet-blue veiling over them, others with buds not yet opening, hardly showing color. Even the specimens show how generously they are blooming and what a sight they are.

Leaving Cima, we went past the old Death Valley Mining Company's property and on through Cedar Cañon of the Mid Hills, next the Providence Mountains. We intended to go across to Fenner but were told the Goffs road was better. It was a splendid ride and before we came to the forks, we found many interesting plants—verbena (blue), the big four o'clocks, a striking *Pentstemon Palmeri* over four feet high—five, I do believe, a dozen or more of the long graceful stalks of bloom, swaying gently in the breeze. In the cañon we found apache plume (*Fallugia paradoxa*) and *Tetradymnia comosa*; such large *Eriophyllum Wallacei*, six inches and over across. On the hill we found *Psilostrophe* again, and again between Vontrigger and Goffs, and *Baileya multiradiata* and other flowers on the other side of Cima. The *Krameria*[†] I found there grew erect instead of spreading out in a low thorny bush like other *Krameria* I knew hitherto. The branches are more ascending without the sharp angles. The sample I collected has no fruit but the spines do not show conspicuously on the densely hairy ovary as they do almost at once in *Krameria canescens* growing around Barstow. I saw these erect ones only on the stretch between Vontrigger and Goffs, and all that I saw were of the ascending type of growth.

Barstow, June 1, 1931.

[†] *Krameria glandulosa* Rose & Painter (W.L.J.).

WILDERNESS AREAS IN CALIFORNIA

W. L. JEPSON

Every botanist in California must regret the rapid change in local floras or even extermination of various native plant areas in the Californian valleys and Coast Ranges which have had for so many years the greatest interest for field students in the west, and which were often sought out by scientific travelers from countries in Europe.

The native vegetation of California, especially that of the valleys and foothills, has been greatly altered during the last sixty years and the process is still going on. The factors involved in driving out the native flora are mainly three: first, agriculture in all its forms, which is exceedingly destructive; second, industrialism, which involves very considerable areas and is usually more complete as to annihilation than agriculture; third, the introduction by man, mainly unconscious, of alien plants, chiefly from the Mediterranean region, which are replacing the native plants in a large scale way. Alien plants have, for example in the Sierra Nevada foothills, replaced the native vegetation from 20 to 75 per cent of the ground cover in open country in many districts.

I do not at the moment recall any native species which has been absolutely exterminated as a result of these various changes, but certain plants have been so depleted that even a botanist finds it difficult to discover a few individuals in places where once they were common. The entrance of the automobile on the scene of the social structure has, to be sure, enabled city populations to gather more or less recklessly great quantities of the native flowering plants, some of which are often found useless after a few hours. The role of the automobilist is, however, confined to areas bordering the highways and as a result of his activity conspicuous species may become rare or exterminated only locally. The gathering of native plants by commercial firms for use horticulturally also results in more or less depopulation of local areas. In a few cases, however, the gathering of native plants for sale probably results in their eventual increase. For instance, certain lily bulbs cannot be taken from the ground without scaling extensively. Each of the scales is a potential plant and becomes such after a few years. A few species having somewhat similar organs are likewise increased by the operations of the plough but, in general, the effects of cattle, sheep, cultivation of the soil, alien immigrants and industrial sites are paramount in their adverse effect upon native plant societies.

While the high mountain country has been less altered by the forces mentioned than other parts of the state, yet it is probable that in the long run the deteriorating changes caused by the factors of civilized life will reach everywhere. It is, therefore, with the greatest satisfaction that botanists will learn that the United States Forest Service has caused to be set aside in California sixteen preserves to be designated as primitive areas where "no permanent

improvements of a recreational nature will be permitted" and only such roads and trails will be built as are necessary for fire protection and administration. These sixteen tracts comprise 1,744,412 acres.

The United States Forest Service in its policy of forest use in relation to recreation has always pursued a forward-looking and progressive policy—a policy worked out in the interests of the public at large, not merely for today but also with a wise foresight as to the decades ahead. A mighty landmark in Forest Service policy was made by William Greeley during the latter part of his tenure as Chief United States Forester when he refused a permit for the building of a scenic railway to the summit of Mount Hood in Oregon.

These primitive tracts are, to be sure, not set aside especially for botanists and yet perhaps for no other class of our citizens will the areas mean so much scientifically. They will in effect be natural gardens where the native vegetation may go on undisturbed by the factors which are so destructive at lower altitudes, as in the Great Valley. These areas, the list of which is furnished by the Forest Service, are as follows:

AGUA TIBIA, in San Diego County—25,910 acres, in the Cleveland National Forest, including part of the Agua Tibia range and peak of that name. From these mountains wonderful views can be obtained of the desert and ocean.

CARIBOU BUTTE, in Lassen and Plumas counties—16,442 acres, in the Lassen National Forest. This is a region of volcanic buttes with many interesting lava formations. Elevations from 6,000 to 7,000 feet.

CUCAMONGA, in San Bernardino County—5,000 acres in the San Bernardino National Forest. A region varying from rolling benches to steep cliffs, immediately adjacent to intensively used recreational centers. Elevations from 5,000 to 9,000 feet.

DESOLATION VALLEY, in Eldorado County—41,380 acres, in the Eldorado National Forest. Located in a high alpine country of granite peaks and skyline lakes, with elevations ranging from 6,500 to 10,120 feet.

DANA-MINARETS, in Mariposa, Madera and Mono counties—82,181 acres, in the Mono and Sierra national forests. A portion of the Minaret Range, including Mt. Dana, 13,050 feet, and Mt. Lyell, 13,090 feet, a region of perpetual snow, with gorges, mountain meadows, glaciers and glacial moraines, form the main features of this High Sierra country.

EMIGRANT BASIN, in Tuolumne County—98,044 acres, in the Stanislaus National Forest; on one of the routes of the covered-wagon pioneers. An area of rugged granite peaks, the highest being Leavitt Peak, 11,575 feet.

HIGH SIERRA, in Fresno, Tulare and Inyo counties—761,790 acres, in the Inyo, Sierra and Sequoia national forests. A region of perpetual snow with many mountain lakes; the headwaters of the Kings

River and other streams. Typical High Sierra country with elevations from 4,000 to 14,000 feet, and many peaks above 12,000 feet.

HOOVER, mostly in Mono County—20,540 acres, located in the Mono National Forest along the crest and east side of the High Sierra. Contains many mountain lakes, meadows and numerous peaks over 13,000 feet elevation.

MARBLE MOUNTAIN, in Siskiyou County—237,527 acres, in the Klamath National Forest, so called because of the limestone formation which resembles white marble. A high wilderness country with many lakes and streams.

MIDDLE EEL-YOLLA BOLLY, mostly in Trinity County—143,386 acres, in the California and Trinity national forests. Located on the headwaters of the Trinity River and smaller streams. A country of virgin forests and rugged topography with several high peaks.

SALMON-TRINITY ALPS, in Trinity, Siskiyou and Shasta counties—196,420 acres, in the Klamath, Shasta and Trinity national forests. A region of granite peaks ranging from 7,000 to 8,000 feet, with remnants of former glaciers and showing the results of glacial action. Contains many alpine lakes and streams.

SAN GORGONIO, in San Bernardino County—20,000 acres, in the San Bernardino National Forest along the summit of the San Gorgonio Range. Elevations vary from 7,000 to 11,485 on San Gorgonio Peak, the highest mountain in southern California. Topography rough and broken and in some places precipitous.

SAN JACINTO, in Riverside County—23,291 acres, in the San Bernardino National Forest. A picturesque region surrounding San Jacinto Peak, 10,805 feet, from whose summit can be had a wide view of mountains and deserts.

SOUTH WARNER, in Modoc County—70,682 acres, in the Modoc National Forest. Located on a high ridge, 15 miles long, overlooking the Nevada deserts. This ridge is a "fault" which resulted in the formation of the Warner Mountains. There are many glacial lakes and peaks over 9,000 feet.

THOUSAND LAKE VALLEY, in Shasta County—16,335 acres, in the Lassen National Forest. A rugged timbered area surrounding McGee Peak, containing many lakes scattered in the pine and fir forest.

VENTANA, in Monterey County—45,520 acres, in the Monterey Division of the Santa Barbara National Forest. A rough country with elevations from 1,200 to 4,800 feet on the headwaters of the Carmel and Big Sur rivers.

FIELD NOTE ON A DESERT WASH

JOHN THOMAS HOWELL

A SAN FELIPE VIGNETTE. A collecting trip to the San Felipe Wash on the western borders of the Colorado Desert in November, 1927, disclosed still the destructive force and evident ravages of floods which swept through the region during the preceding winter. Canyon

roads in the vicinity are marked now by rocky beds washed clean of earth and road-embankments are scarred by treacherous and deeply gnawed gullies. Here and there on the broad sandy, gravelly flood-plain of the San Felipe, now dry after the rainless months of summer and autumn, lie piles of broken and uprooted brush, collected and dropped by the torrent. Hundreds of individuals of *Agave deserti* are strewn along the wash, showing that somewhere above, the flood had ripped out a planting of this rare endemic. Many of the uprooted *Agaves* are withered and will probably die, but many have been left half buried in the sand and are growing where they have been dropped. But all the work of the flood is not destruction for gravel bars and sand banks have been built and where there were quiet back-waters flats of silt and fine sand have been deposited. In such a place on finely sifted soil, protected by shrubs of *Chrysothamnus paniculatus* now covered with a mass of yellow bloom, a trio of interesting *Euphorbias* are growing together. All are annuals and all spread prostrate, much-branched stems over the ground, stems that are starred with delicately colored and variously shaped flower-like involucre. Can this one, appearing in richness of color like a magic carpet of the East, be an annual phase of *E. polycarpa*? So it would seem, related perhaps to *E. cinerascens* Engelm., a type with slightly pubescent herbage and very narrow gland-appendages. Here, scarcely a span distant, is *E. setiloba*, the fine stems copiously glandular, bearing myriad small involucre with gleaming-white, stellate gland-appendages. No artifact of man was ever contrived so amazingly. And, as if planning to imitate their nearly endless array of form and color, yet another species grows in the colony. It is *E. pediculifera*, a more elegant species than the others with pale grey-green herbage and broad white gland-appendages which fade to deep rose in age. From all about, the sparsely planted rocky walls of the desert canyon look down, seeming grim and unordered in contrast to the minute details of beauty on the alluvium below. The shrubs on those arid slopes, scraggly and dormant, exhibit from a distance, the monotony of a single species, but experience has shown that at appropriate seasons such brush produces flowers of many orders and kinds. And there too, among disintegrating rocks and in shallow soil-pockets grow many small plants, each in its own niche or cranny, each as fine and as inspiring as the fragile mats of *Euphorbia*.

NOTES AND NEWS

An extremely readable paper on "The vegetation of the Mohave and Colorado deserts of southern California" by the late S. B. Parish has been published in *Ecology* for July, 1930 (11:481-499, figs. 1-9).

Mr. Carl Purdy is making cultural studies of all Pacific Coast *Cotyledons* and *Sedums*. He would be glad to receive living material of the native species for his garden at The Terraces, Ukiah, California.

A PHYLOGENETIC SERIES OF THE CALIFORNIA CLOSED-CONE PINES SUGGESTED BY THE FOSSIL RECORD

HERBERT L. MASON

During the course of extended studies in the fossil record, in an attempt to trace the origin and migration of the forest associations of California and to explain the highly endemic nature of the flora, many interesting things have been brought to light. Outstanding among these is an unusually long series of fossil cones of the species of closed-cone pines now inhabiting the coastal and insular regions of California. This series runs from the present through the Recent and Pleistocene, and well down toward the base of the Pliocene. Altogether over three hundred such cones have been taken, and in many instances they are accompanied by wood, fascicles of needles, staminate catkins, pollen and seeds. In a group with a morphological structure pointing to close inter-relationship, such a series of plant remains from the fossil record ought to suggest something as to the nature of this relationship.

The term "closed-cone pine" is locally applied to those species of hard pines whose cones are persistent for long periods on the tree and frequently remain closed for several years after maturity. It is not uncommon to find the cones still persistent, only a few feet from the ground, on the trunk of a one hundred foot tree. Such cones may have been produced thirty-five or forty years before. Most frequently, however, five to ten years would represent the average duration of the cones on the trees. There are at present four rather polymorphic species with two recognized varieties, which by no means give a proper concept of the variation within the group. In addition to these there are two marked forms, now presumably extinct, described from the fossil record. A discussion of these species, fossil and living, follows.

PINUS MASONI Dorf. Figure 4

The earliest record of these pines was taken from the lower Pliocene where they occur in the Merced sandstones near San Francisco and in the Pico shales near Ventura, California. Another poorly preserved cone was taken from the Pliocene Santa Clara lake beds on Coal Mine Ridge near Palo Alto¹. This Pliocene material, though closely resembling the modern *Pinus muricata* Don, has been given the name *Pinus Masoni* by Dorf,² and varies from the modern form in having the scales of one side of the cone consistently produced into a triangular attenuate beak. It falls within the range of the extremes of variation of the modern *Pinus muricata*, though by no means can it be said that this extreme of variation characterizes the modern species. What records are available to us indicate that *Pinus Masoni* was essentially of this type throughout its entire range during the Pliocene. It seems to have been a part of an insular forest growing during Plio-

MADROÑO, vol. 2, pp. 49-56. Feb. 25, 1932.

¹Scott, F. M., Bull. Torr. Bot. Club, 1927.

²Dorf, Erling, Pliocene Floras of California. Carn. Inst. Wash. Pub. 412, 1930.

cene time on islands that extended from what is now central California to southern California. In the southern locality there was, in association with this species, another pine that has been called *Pinus Pieperi* by Dorf and has been referred to *Pinus sabiniana* of the modern floras. In the northern localities the pine is in association with *Pseudotsuga* which is well represented by cones and wood. In studies of the Pliocene floras of California no other traces of species of closed-cone pines were found. The record as we now know it suggests this form as ancestral to the modern closed-cone pines.

PINUS LINGUIFORMIS Mason sp. nov. fos. Figure 5

Cone 10 cm. long by 5 cm. wide³, ovoid, attenuate, asymmetrical, apparently reflexed on the branch; scales on the outer side produced to a long flattened tongue-like beak 8 to 12 mm. long by 6 mm. wide, tipped by a stout prickle, of which our specimen shows only a portion remaining.

Locality. "From a layer of black clay between 800 and 900 feet at the 'Los Alamitos pump station' of the Long Beach Water Works about one-half mile northeast of Signal Hill in Los Angeles County. The layers of clay are thin (five to twenty inches), separated by thick layers of sand and fine gravel."

Collection. Univ. Calif. Coll. Pal. Bot. no. 446.

This cone was sent in by Mr. Catey, engineer for the Long Beach Water Works. Superficially it resembles an attenuate form of the "*Pinus Masoni*-*Pinus muricata*" complex, but is more massive and has a much fewer number of produced scales per cone. This is characteristic of the smaller-coned species. The tongue-like character of these scales, also, is not found in the other species group. Probably the material from the La Brea asphalt beds, in part at least, may be referred to this species. Such disposition, however, needs confirmation by re-study of the specimens now deposited in the Los Angeles Museum. The cone figured by Mason in "*Fossil Records of Some West American Conifers*" (Plate 3, Fig. 1), is a little too massive to be referred to *Pinus muricata* and more probably should be referred to *Pinus linguiformis*.

Pinus linguiformis clearly shows relationship to the Pliocene *Pinus Masoni*, but with respect to its attenuate habit and the reduction in the number of prolonged scales, as well as in the massiveness of these scales, it suggests a marked tendency toward the modern *Pinus attenuata* Lemmon.

³The specimen is very much flattened and the figures refer to the width of the fossil cone. Correction for this flattening gives the cone a diameter of only 32 mm. at its thickest point. It must be borne in mind also, that in the preservation of plant remains of this sort a marked shrinkage occurs. This shrinkage sometimes amounts to as much as 25% in the drying of the specimen. These facts necessarily alter the concept of the species as it naturally grew.

⁴Transmitted by letter of November 10, 1930, from Mr. Catey.

We know little as to the habitat of *Pinus linguiformis* unless, as has been suggested, it is specifically identical with material in the La Brea deposits. Here we have a small-leaved form of *Quercus agrifolia*, a thick-seeded form of *Juniperus Californicus*, *Sambucus glauca*, *Celtis reticulata*, *Xanthium* sp., and *Juglans Californica*. As suggested by this association the habitat was considerably drier than the present habitat of *Pinus muricata* but is not out of keeping with that of *Pinus attenuata*.

PINUS MURICATA Don. Figure 3

Of all the coastal species of closed-cone pines, *Pinus muricata* is the most widespread and apparently the most successful. It runs through a great range of variation in morphological detail as well as in adaptation to habitat. The most extreme variation occurs in the cones, particularly with regard to the shape of the processes on the scales, which ranges from slightly pyramidal to an elongate cylindro-conical structure. Sometimes they are straight and sometimes recurved; usually they are tipped by a prickle. The more typical form of the cone scale of the modern species is a broad pyramidal, somewhat recurved umbo, tipped with a usually persistent prickle. The cones range from 3 to 8 cm. in length. A small "thimble-cone" form is found on Santa Cruz Island. The habitat range is equally impressive. The literature repeatedly refers to *Pinus muricata* as a "swamp pine". This is far from being the general truth. It is true that along the Sonoma and Mendocino county coasts there occur marshes and poorly drained areas in which *Pinus muricata* grows, but it likewise grows on the hill slopes and, in some cases, on hilltops where drainage is rapid. Much of the Inverness Ridge region is of this type. The largest and best developed trees here are on well-drained rotten Montara granite. Likewise at Monterey they grow on granitic soil that is well drained.

The distribution of *Pinus muricata* is of particular interest. It occupies a narrow, highly discontinuous strip along the coast from the vicinity of Trinidad Head in Humboldt County to La Purissima Ridge in Santa Barbara County, thence southward in Insular California to Guadalupe and Cedrus islands, and again on the mainland of Baja California at Point San Quentin, where it has been described as *Pinus muricata* var. *Anthonyi* Lemmon, a form of rather doubtful taxonomic rank.

During Pleistocene time *Pinus muricata* appears always to have been associated with *Pinus radiata*, and it seems evident from the nature of the fossil record that *Pinus radiata* was the dominant species of the two. Today we find them associated in only two very local spots, one on Huckleberry Hill at Monterey and the other near the northern boundary of San Luis Obispo County.

The species has been found in the fossil record from Lower Pleistocene through the Recent. The cones at Carpinteria⁵, which number

⁵ Chaney and Mason, Science, n. ser., vol. 76, no. 1702, p. 156.

over 50, fall well within the range of variation of the modern species but have a more pronounced development of the scales, as is indicated in the illustration in figure 3. At Millerton in Marin County, seven cones of *Pinus muricata* have been taken, all of which compare more favorably with the typical form of today as it grows on Inverness Ridge in Marin County. At Tom's Point, near the entrance of Tomales Bay, three cones of this species have been taken which conform exactly with those from the contemporaneous Millerton beds. There seems no doubt that this large and variable species has been on the ascendancy since Pliocene time, where it appears as *Pinus Masoni*. It then goes through a great variation during the Pleistocene and finally emerges during the Recent, as a highly plastic and successful species, which from all indications is on its way toward an even greater multiplicity of habitat forms. These, if given a chance by man, will probably before another geologic epoch greatly increase the numbers of closed-cone pines.

PINUS REMORATA Mason⁶. Figure 1

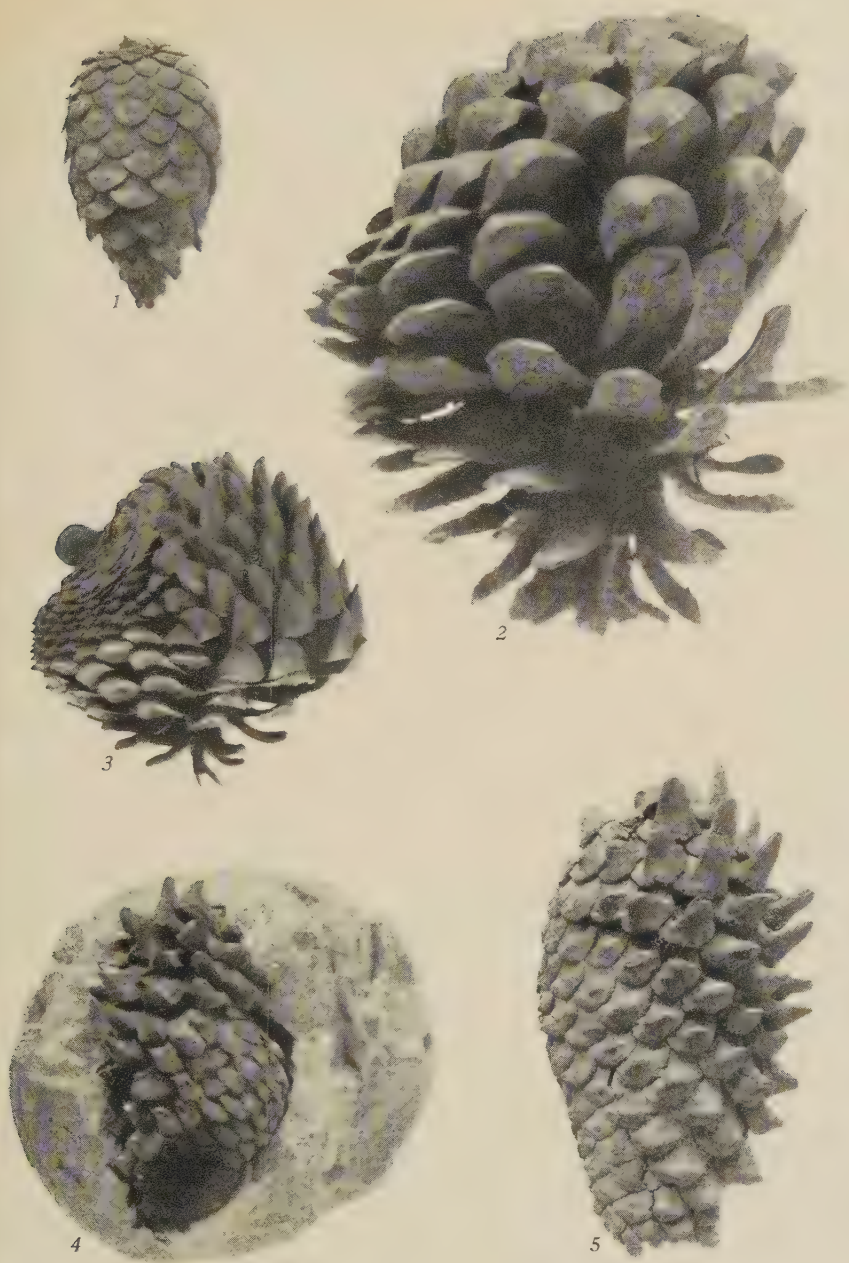
The Santa Cruz Island pine is a very characteristic small-coned pine with the cones ovoid in shape and ranging from symmetrical to only slightly asymmetrical. Some of them show a slight swelling on the umbos. Most of them stand at right angles to the stem. The needles are in fascicles of two and are rather heavy. They contain from twelve to eighteen resin ducts. Today this pine is confined to some of the islands of Alta and Baja California. In the past we have records of its occurrence on Santa Cruz Island⁷ as well as in the asphalt deposits at Carpinteria on the adjacent mainland. In its morphology as well as its aspect this pine is clearly related to *Pinus muricata*, but certainly is a step toward the other insular endemic, *Pinus radiata* var. *binata* Engelm. of Guadalupe Island. It seems evident that *Pinus remorata* was differentiated prior to middle Pleistocene and has persisted on the islands. Apparently it is not a successful invader. The presence of remains of the northern elephant with the fossils in the Pleistocene has been used to indicate a continental connection of what are now islands to the mainland. In spite of the connection this pine, at least in view of present information, has not been able to migrate and to establish itself on the present continent. All of the fossils in hand are very symmetrical and do not range over 6 cm. in length.

PINUS RADIATA Don. Figure 2

Pinus radiata, the Monterey Pine, is perhaps the most widely known of the closed-cone-pines. It is very variable in the shape of the cone and in the extent of development of the scales, a fact which has resulted in an extensive synonymy in botanical literature. In general, the species has three needles to a fascicle, although some trees will

⁶Mason, H. L., Madroño, vol. 2, p. 8, 1930.

⁷Chaney and Mason, Carn. Inst. Wash. Pub. 415, 1930.



1. *PINUS REMORATA* Mason. 2. *P. RADIATA* Don. 3. *P. MURICATA* Don. 4. *P. MASONI* Dorf. 5. *P. LINGUIFORMIS* Mason. See "Explanation of Plate," p. 56.

show as high as thirty per cent of the needles in fascicles of two, and occasionally trees are found with needles in fascicles of four and five⁸. The umbos or the enlarged scales of the cone are usually rounded, sometimes somewhat angular or quadrate. The cone is usually broadly ovoid in form and asymmetrical in outline. Considerable variation in the size of the cone occurs also. In general, there is a marked average increase in size observable as one moves southward in its range, although there is also much local variation.

The species ranges discontinuously on the mainland of California from near Ano Nuevo Point on the San Mateo-Santa Cruz County line to the vicinity of Moro Rock in San Luis Obispo County. It occurs again in typical form on Guadalupe Island⁹ two hundred miles off the coast of northern Baja California along with *Pinus radiata* var. *binata* Engelm. The latter is characterized by having a predominant number of needles in fascicles of two, as well as by having slightly smaller cones which tend to vary toward *Pinus remorata* Mason.

The fossil records of *Pinus radiata* are particularly interesting because of the former extension of range indicated and because of the evolutionary aspects of the foliage suggested. The southernmost record thus far taken is from the asphalt deposits at Carpinteria, where it is associated with *Pinus muricata* and *Cupressus goveniana* as well as with several species of *Arctostaphylos* and one of *Ceanothus*. The cones are large and well formed in a manner suggestive of those of the southern part of the modern range. In the habitat they outnumber the cones of *Pinus muricata* considerably, yet in the fascicles of needles that are so abundant in the deposit there is a marked preponderance of 2-needle fascicles. They outnumber the 3-needle fascicles about eight to one. Proceeding northward we find *Pinus radiata* again in a gravelly clay deposit at Mussel Rock south of San Francisco, where it is associated with *Pseudotsuga*, and again at Millerton and at Tom's Point on Tomales Bay. The Millerton locality is of particular interest because it occurs on the edge of a forest of *Pinus muricata* and contains an overwhelming preponderance of fossil *Pinus radiata*. Here a series of over two hundred cones have been taken, of which only seven are *Pinus muricata*. Although the deposit at Tom's Point is not so rich as that at Millerton, the preponderance of cones of *Pinus radiata* here also is well marked.

No record has as yet been taken that can be cited definitely as *Pinus radiata* var. *binata* Engelm. However, the overwhelming preponderance of 2-needle fascicles in the Pleistocene deposit at Carpinteria would suggest that in the development of this species the 2-needle phase was, at that time, far more important than at present and possibly was ancestral to the 3-needle phase.

⁸ Haasis, F. W., *Madroño*, vol. 2. p. 29, 1931.

⁹ The writer wishes to express his appreciation to Mr. J. T. Howell and to the California Academy of Sciences for the use of notes and material obtained on a recent trip to Guadalupe Island, where the occurrence of typical *Pinus radiata* Don in the living flora was definitely established.

PINUS ATTENUATA Lemmon.

The knob cone pine is another relatively widespread species of the closed-cone group. It occurs in discontinuous patches in the interior from the vicinity of McKenzie Pass in Oregon southward through both Coast Ranges, the Sierra Nevada, and the cross ranges of southern California to the hills back of Ensenada in Baja California. It is characterized by needles in fascicles of three and by long-attenuate cones with broad pyramidal umbos on the swollen scales. As compared with *Pinus muricata* only a few of the scales are elongated. The remaining scales on the swollen side are large and ridged but only slightly raised.

Fossil records of this species are not common. There are a few cones from the Pleistocene portions of the auriferous gravels near You Bet in the Sierra Nevada foothills. These specimens are indistinguishable from the modern species¹⁰. The elongate nature of the cone and the relatively few elongated scales, together with the more arid habitat, suggest a relationship to the fossil *Pinus linguiformis* Mason.

DISCUSSION

From the point of view of age there is no doubt that, of the closed-cones so far known, *Pinus Masoni* Dorf is without question the oldest. This, of course, does not establish it as ancestral to all of the rest. The fossil record, though in this case abundant, is by no means complete. We can say that the record suggests that this species, in the absence of any evidence to the contrary, is probably either ancestral or close to the ancestral type of the closed-cone pines. It is no long step from this to a pine of the type of *Pinus linguiformis*, and through it to the modern *Pinus attenuata*. The evidence seems to indicate that this change took place about the middle of the Pleistocene. *Pinus Masoni* probably gave rise also to *Pinus muricata* directly, as it seems to merge almost insensibly into it through the *Carpinteria* type to the *Millerton* type, and finally to the species as it exists today on the Pacific Coast of North America. Some time during the Lower Pleistocene *Pinus remorata* branched off from this line, and from it the 2-leaved, small-coned *Pinus radiata* var. *binata*. The *Carpinteria* deposits furnish us with the information that *Pinus radiata* was more characteristically a 2-needle pine during that time. The *Millerton* deposits likewise show a high percentage of 2-needle fascicles. Finally the modern species was left to us with the characteristic 3-needle clusters. *Pinus muricata* we can look upon as having a slow but early beginning. The species is perhaps still in the ascendancy. It was less common during the Pleistocene than at present, particularly as to individuals. *Pinus radiata* belongs to the Pleistocene and apparently is fast disappearing. In its present distribution and abundance the species is but a shadow of what it used to be. Likewise *Pinus radiata* var. *binata* and *Pinus remorata* probably have been saved to us purely through the protection

¹⁰ Mason, H. L., Carn. Inst. Wash. Pub. 346, p. 139, Plate 2, Fig. 2, 1927.

of insular isolation, while *Pinus attenuata* seems to be of rather recent origin. It appears in middle Pleistocene, but not commonly, and becomes more abundant in the Recent.

Any hypothesis that is based upon the fossil record naturally rests upon fragmentary evidence. When new evidence is available changes must be made in our hypothesis to accommodate it. It seems, however, that in a region such as this, where Pleistocene deposits are relatively abundant and preservation is remarkably perfect, we now have most of the evidence that will bear upon the problem for this period. The evidence in hand suggests the relationships herein outlined. We need more material from the Pliocene and it seems that this will be forthcoming as that period is more completely studied. As the problem now stands we can say that Insular California, as it existed during the Pliocene, was the home of the closed-cone pines and that most of the differentiation that now characterizes that group took place during the Pleistocene.

Berkeley, California.

EXPLANATION OF PLATE I

- Fig. 1. *Pinus remorata* Mason. $X\frac{2}{3}$ Fossil cone from the Willow Creek formation of Santa Cruz Island. Pleistocene.
 Fig. 2. *Pinus radiata* Don. $X\frac{2}{3}$ Fossil cone from the Asphalt deposit near Carpinteria, California. Pleistocene.
 Fig. 3. *Pinus muricata* Don. $X\frac{2}{3}$ Fossil cone from the Asphalt deposit near Carpinteria, California. Pleistocene.
 Fig. 4. *Pinus Masoni* Dorf. $X\frac{2}{3}$ Fossil cone from the Merced sandstones $1\frac{1}{2}$ miles south of Fleishhacker Pool, San Francisco. Pliocene.
 Fig. 5. *Pinus linguiformis* sp. nov. fos. Mason. $X\frac{2}{3}$ Fossil cone from the Los Alamitos pump station of the Long Beach Water Works near Signal Hill, Los Angeles County. Pleistocene.

NOTES AND NEWS

Miss Harriet A. Walker, for many years an assistant in the Herbarium of the University of California and whose death was announced in this Journal for December, 1929, left property to the University of California valued at about \$4,000. The Board of Regents of the University of California have decided to preserve this legacy intact and to use it as an endowment for books for the Botanical Library. The income will enable the Department of Botany each year to purchase very desirable sets and single volumes in addition to those provided from regular University funds, and it is believed that because of Miss Walker's great interest in the Department this will more nearly meet her wishes than any other disposal that could be made of the legacy.—H. M. HALL.

Genetic researches upon the well-known *Collinsia bicolor* of our vernal flora are published in recent issues of the *Zeitschrift für Induktive und Abstammungs- und Vererbungslehre* (vol. 55, hefte 1-3). The author is the Norwegian botanist, Gunnar Hiorth.

NOTES AND NEWS

Mr. M. W. Talbot, who has for some ten years been engaged on weed control work in the United States Bureau of Plant Industry at Washington, has recently been transferred to the United States Forest Experiment Station at Berkeley. In California, as "Senior Forest Ecologist", he will have to do with the forage research connected with range lands.

In the course of a botanical reconnaissance, having to do with woody plants, Dr. R. W. Chaney, Professor of Paleontology in the University of California, reached Trinidad, West Indies, Jan. 2, 1932. He writes from Trinidad: "Each of the islands in the British West Indies I have found to be a botanical gem, with new fossil plant localities here and at Santa Lucia, both of critical interest." Thence he goes to British Guiana, afterwards flying to Caracas, Venezuela.

Dr. P. A. Munz, Professor of Botany in Pomona College, Claremont, returned early in January from Europe where he has been for a half-year engaged in research studies in systematic botany. He paid especial attention to Chilian and Argentinian Onagraceae, discovering interesting similarities to Californian species. He visited the herbaria at Edinburgh, London, Berlin, Prague, Geneva and Paris.

Dr. J. H. Faull, Professor of Botany in Harvard University, visited California in September, 1931, in connection with his studies on fungi.

Professor Geo. J. Peirce's "Experimental Plant Physiology" is a recently issued text of 166 pages designed to enlighten "the curious as to the qualities and operations of living organisms." The experiments do not involve highly elaborate apparatus, but only such simple instruments as will give accurate results. (Henry Holt & Co.)

A new journal of botany issued by Miss Alice Eastwood and Mr. J. T. Howell of the California Academy of Sciences Herbarium is entitled "Leaflets of Western Botany". The first number (January, 1932) contains an article on the cultivated *Pittosporums* in California by Miss Eastwood and an account of a new *Baeria*, *B. Bakeri*, from the Mendocino coast by Mr. Howell.

A recent issue of the Proceedings of the California Academy of Sciences (ser. 4, vol. 20, no. 5) contains an article by Miss Alice Eastwood on "New Species of Plants from Western America". These new species cover a wide range of families. In the same publication, nos. 3 and 4, are two articles by Mr. J. T. Howell, one on "The Genus *Pogogyne*", the other on "A Great Basin Species of *Physocarpus*".

Dr. W. S. Cooper of the University of Minnesota finds, on a visit to Glacier Bay, Alaska, that the Coast Hemlock (*Tsuga heterophylla*) and Mountain Hemlock (*Tsuga Mertensiana*) both layer, though the Sitka Spruce (*Picea Sitchensis*) does so more abundantly and vigorously. He discusses the matter of layering in these species in the Botanical Gazette for June, 1931 (91:441-451).

THE FLORA OF A DESERT RANGE, THE WHITE MOUNTAINS

A meeting of the Society was held November 12, 1931, at 8:00 p. m. in Room 2093, Life Sciences Building, University of California. In the absence of Dr. Peirce, the President, Prof. H. E. McMinn, the First Vice-President, occupied the chair. Thirty members and guests were present.

Mr. Victor Duran gave a very interesting lecture on the general aspect of the flora of the White Mountains of California and Nevada, where he has collected botanical specimens during several summers. This is one of the desert ranges of the Great Basin and is situated mostly in Inyo and Mono counties, California, extending partly into Mineral and Esmeralda counties, Nevada.

The lower slopes, especially at the edge of Owens Valley and Deep Springs Valley, at elevations of 4000 to 5500 feet, are, said Mr. Duran, dry and exposed and bear a variety of desert shrubs, many of which are characteristic of the Lower Sonoran Zone. *Yucca brevifolia* occurs on the eastern slopes near Deep Springs Valley, but appears to be quite uncommon. The sagebrush, *Artemisia tridentata*, is the dominant shrub of the region, occurring throughout the range below timber line, except on the most exposed lower slopes. The piñon, *Pinus cembroides* var. *monophylla*, and the juniper, *Juniperus Californica* var. *Utahensis*, form an open woodland throughout the range between 6000 and 8500 feet elevation. Above the piñon-juniper belt, one frequently meets pine forests composed of *Pinus flexilis* and *Pinus aristata*, but more often the Transition Zone is characterized by a scattered growth of the desert mahogany, *Cercocarpus ledifolius*, or nearly pure stands of *Artemisia tridentata*. *Pinus flexilis* and *Pinus aristata* occur nearly always in company, forming forests on the sheltered slopes and in the cañons. Sometimes appearing in the piñon belt these two pine species extend throughout the Boreal Zone to timber line, which occurs between 11,000 and 12,000 feet elevation. On account of the rolling nature of much of the higher country there is a fairly extensive arctic vegetation. *Trifolium monense*, a species known only from this range, is one of the characteristic plants, and a valuable sheep feed.

Several large meadows occur in the higher parts of the range and the aspen, *Populus tremuloides*, is plentiful in suitable parts of the Transition and Canadian zones. *Populus trichocarpa*, *Betula fontinalis*, and several species of willow are found along the lower courses of the stream.—E. K. C.

WEED CONTROL IN CALIFORNIA

The Society met on Thursday, January 21, 1932, in Room 2093, Life Sciences Building, University Campus, Berkeley. Dr. Geo. J. Peirce, the President, presided. About thirty-five members were present. The address of the evening, Weed Control in California, was given by Dr. W. W. Robbins, Professor of Botany at the University College of Agriculture at Davis.

For the problems which confront California agriculture there is need, said Dr. Robbins, of plant physiologists who have a good training in chemistry as a background. The financial loss to California agriculture by weeds is greater than by insects and plant pests combined. The necessity for control of weeds is justified by the economics of the situation. In the delta region I have seen, said Dr. Robbins, farming lands under weed control cultivated for \$4.00 to \$5.00 per acre, while equally valuable lands in the same neighborhood cost \$40.00 to \$50.00 per acre for cultivation. There is no question as to great losses. The presence of Puncture Vine (*Tribulus terrestris*) even causes lands to be abandoned. The railroads spend money in Puncture Vine control and the State Highway Commission spent \$80,000.00 in 1931 on Puncture Vine eradication.

Of the many weeds in California there are five or six which may be used to illustrate the discussion. *Tribulus terrestris* has actually brought about the abandonment of thousands of acres of valuable lands near Bakersfield. The barbed thorns of the fruits enable it to spread widely and rapidly in shipments of vegetables, fruit, cattle food and numerous other ways. A second weed of comparatively recent introduction is *Hypericum perforatum*. In 1930 it was estimated that this plant occupied one hundred thousand acres of grazing lands in northern California—from the northern Sierra foothills to Humboldt County. A third outstanding pest is *Holcus halepensis* (Johnson Grass). It is so serious a pest in the richest lands that sometimes farm leases cannot be renewed. At Modesto the Chinese have refused to re-lease certain tracts, and if Chinese cannot make a living on the land who can? asked the speaker. A fourth introduction is *Alhagi camelorum* (Camel Thorn) of the Old World which spreads by deep-seated rootstocks from an initial infection and makes circular patches of the thorn. The California legislature regarded the threat of Camel Thorn so seriously as to appropriate \$15,000.00 to eradicate it, but did not specify in what manner. About 800 acres are now infected. The herbage is browsed and the seed passes unharmed through the digestive tract of animals. A fifth weed is *Cynara scolymus* (Artichoke) which covers about 3000 acres near Benicia. A cup of Diesel oil put into the heads at flowering time kills the plant, so that a means of control has been found. A sixth plant, *Lepidium Draba* (Hoary Cress), notorious for its effective rootstocks, was first noticed in the Pajaro Valley about 1903.

For control we need an accumulation of facts: 1. Life history studies of all pernicious weeds. 2. A development of chemical solutions for general use and of special toxic chemicals in relation to the physiology of each weed species. 3. A means of sterilizing soil so as to form a weed-free strip along irrigation canals. 4. A life-history study of water plants since these, such as tule and cat-tail, block irrigation channels and yet they cannot be reached by sprays. 5. A means of control of lawn seed, especially *Cynodon dactylon* (Bermuda Grass) and *Taraxacum vulgare* (Common Dandelion), which cause so much expense under present methods. Lawn-owners, however, in the main want something simple. You come to the lawn and say "Boo"—and the weeds disappear.

"The weed problem is basically a botanical problem and it is necessary to approach it from the botanical standpoint" was a remark which summed up the speaker's experience. A lively discussion followed the speaker's paper. Mr. M. W. Talbot of the United States Forest Experiment Station agreed with the speaker in emphasizing the need of chemical training on the part of the investigator of weeds. Professor W. W. Mackie thought that grazing might control Camel Thorn, since on his Asiatic expedition it was the sole resource of the camels in his camel train. It was his belief that introduction was caused through the camel dung around the roots of the date palms brought into the Coachella Valley from the Old World. Professor W. L. Jepson pointed out the need of reports to the state authorities of the first presence of alien weeds. It is not many years ago, as time goes, he said, that on their first appearance in California all of these weeds were reported by botanists as occurring at a single station and occupying only a limited area, sometimes only a few square yards. Such narrow infection could, at the beginning, have easily been smothered. In the case of new aliens immediate eradication, he urged, should be a policy for the future. Several other members took part in the discussion. Adjournment was at 9:30.—W. L. J.

THE ANNUAL DINNER FOR 1932

The general session of the California Botanical Society met February 27, 1932, in Room 2093, Life Sciences Building, University of California, at 2:00 p. m. Dr. George J. Peirce, President of the Society, occupied the chair until near the end of the session when he was relieved by Professor H. E. McMinn, the First Vice-President. The following papers were read and discussed.

SOME FACTS OF INTEREST EXTRACTED FROM A COMPARATIVE STUDY OF VIOLA HYBRIDS. By Dr. Jens Clausen, Carnegie Institution of Washington.

CERTAIN PHASES OF PROTEIN HYDROLYSIS BY THE DERMATOPHYTE FUNGI. By Mr. David Goddard, Department of Botany, University of California.

PALAEOBOTANICAL EVIDENCE OF THE ORIGIN OF FLORISTIC DIFFERENTIATION IN THE CALIFORNIA FLORA. Mr. H. L. Mason, Department of Botany, University of California. Vegetation is in process of continuous change. Each species induces conditions in the environment that are unfavorable for the establishment of competitors, including those of its own kind. Climate also is constantly changing. The physiological limits of an organism restrict its activities to a relatively narrow range of environmental conditions. If the environment changes there are three courses open to the plant. It may adapt itself to the new conditions, it may migrate, or it may perish and become extinct.

The physiological limits are not the same for all species. Some may have a wide range of tolerance for a given set of conditions and others a narrow range. In any given habitat some species may be near one extreme of their tolerance range and others may be near the other

extreme. It is evident, therefore, that any change in the environmental complex would exercise a selective influence on the specific content of the plant association. Some species would die out. Others would find conditions nearer their optimum and would tend to dominate the area. Still others would be brought nearer the extremes of their tolerance range and would be forced into a less conspicuous position. It seems therefore that the theory of physiological limits as developed by Livingston and Shreve, and the theory of tolerance as postulated by Goode offer the mechanism of response that permits of changing floras.

There exists in the Sierra Nevada a coniferous forest zoned according to climate. In its northern aspect it is strikingly like the redwood forest of the Coast Ranges. It lacks *Sequoia sempervirens*, however. One cannot escape the evidences of relationship. Tertiary records of western America are abundant in remains of species identical with or closely related to those now segregated into separate forest associations. The Pliocene Santa Clara lake beds of the Santa Cruz Mountains are a striking example where there is found in association *Sequoia Langsdorfii*, *Pseudotsuga taxifolia*, *Pinus Lambertiana*, *Libocedrus decurrens*, *Arbutus*, as well as several other genera and species which are common to both the redwood and Sierran forests. The two modern forests are in all probability climatic segregates from this Tertiary association.

The closed-cone pine forests of the coast offer evidence of similar but much more recent segregation. Palaeontological evidence supports the conclusion that from the Pliocene through the Pleistocene the forest was more continuous than at present, and was largely dominated by *Pinus radiata*. Today there is marked segregation into highly localized areas combined with a strong tendency toward local variations peculiar to each region.

Climatic segregation likewise may account for relationships between widely separated floras. The extensive Miocene forest contained genera and species whose modern equivalents are now discontinuous in such widely separated areas as the Mediterranean region, the Himalaya Mountains, eastern Asia, the Pacific coast of North America and south-eastern United States.

It would seem therefore that floristic differentiation is the product of climatic segregation that our California forests owe their distinctive caste to this biogeographic process.

SOME RECENT CONCLUSIONS ON THE MORPHOLOGY OF THE PLANT-BODY. By Dr. D. H. Campbell, Department of Botany, Stanford University. Botanists, as a class, are extremely conservative regarding the principles dealing with plant morphology. Most of the text-books still retain the same ideas as to the homologies of the plant-body that have been current for a century or more. The generally accepted theory, for instance, that the various organs of the vascular plants can be referred to one of three fundamental organs—stem, leaf, root—can hardly be maintained in view of the facts revealed by modern studies in comparative morphology derived from both fossil and living forms. The methods of the zoologist, dealing with highly individualized organisms, are not applicable to the much less highly organized plants,

whose organs, *e. g.*, leaves, are often temporary, and most of whose cells are much less specialized than those composing the tissues of most animals. The attempts to build up an elaborate system of skeletal structure in plants, based upon the theory of a primitive axis traversed by a "protostele" from which all the more specialized types have been derived, is not borne out by developmental study of the tissues in the primitive ferns, where in some cases, *e. g.*, *Ophioglossum*, there are no cauline steles.

Recent important discoveries of early Devonian vascular plants, show that these had an undifferentiated plant body, with no special organs, such as leaves and roots. They did, however, bear extremely simple sporangia, showing marked resemblance to the sporogonia of certain liverworts. The simplest of these Devonian plants, the Rhyniaceae, show a remarkable resemblance to the Anthocerotaceae, which the writer has long maintained, most nearly, among living plants, resemble the ancestors of the first vascular plants. This theory has been greatly strengthened, both by the discovery of the Rhyniaceae, and also that of some remarkable specimens of *Anthoceros fusiformis*, collected by Dr. G. J. Peirce in August, 1922, near Carmel. Some of these had sporophytes six inches long, and had evidently survived from the previous rainy season. These sporophytes had developed an unusual amount of chlorophyll-bearing tissue, a large central strand of conducting tissue, and a large foot, apparently capable of absorbing water without the intervention of the gametophyte, which showed evidences of disintegration. Except for the presence of a few tracheids in the axial stele, a cross-section of *Rhynia* is hardly distinguishable from that of these large *Anthoceros* sporophytes.

The oldest organ of the vascular plants is the sporangium, and the pollen-sacs and ovules of the flowering plants are descended from the very primitive sporangia of some such simple Devonian plants as the Rhyniaceae, and through these from *Anthoceros*-like ancestors.

The vascular plants are probably of polyphyletic origin—not all derived from a single ancestor—a sort of plant Adam. Among the early Devonian fossils are types which seem to anticipate each of the principal classes of existing Pteridophytes.

BOTANICAL FIELD WORK IN LOWER CALIFORNIA. By Dr. Ira L. Wiggins, Department of Botany, Stanford University. Dr. Wiggins emphasized the importance of secondary exploration of known areas. Although less spectacular than pioneering, and less likely to result in the discovery of new species, this later work is more critical and no less essential. There are gaps in the knowledge which need to be filled. Species must become more fully known, their habits observed, their ranges more accurately limited. After a brief survey of the history of botanical exploration in Lower California, Dr. Wiggins illustrated by a series of interesting slides many distinctive species as well as the major plant associations and general topography of the region.

THE ANNUAL DINNER. The annual dinner of the Society, following the general afternoon session, was held in the evening at the Rockefeller International House, University of California, Berkeley. Dr.

George J. Peirce, President of the Society, acted as toastmaster. By asking the recently returned travelers to report upon their adventures, Dr. Peirce revived an interesting old-time custom of the Society. Dr. Ira L. Wiggins responded with an account of his sojourn in Lower California. Mr. H. L. Mason told of paleobotanical discoveries in Alaska. Dr. Jens Clausen, with a rapid-fire narrative of his survey of European and American botanical laboratories and institutions of plant genetics, won by general consent of the audience both speed and long-distance records. Letters were read from absent members, from Dr. R. W. Chaney, who wrote from the Panama Canal zone, and from Professor W. T. Horne, who sent greetings from the Citrus Experiment Station at Riverside. The musical numbers presented under the direction of Mr. W. W. Carruth were especially enjoyable.

The principal address of the evening was given by Mr. Lloyd Austin, Director of the Institute of Forest Genetics at Placerville, California. For several years, he said, the Institute of Forest Genetics, formerly the Eddy Tree Breeding Station, has made a study of hereditary variations in *Pinus ponderosa*, or Western Yellow Pine. The purpose of the investigation has been to obtain knowledge that will help the Institute in its efforts to develop superior new strains of rapid-growing timber trees.

Pinus ponderosa is one of the most widely distributed of all pines, ranging from British Columbia to Mexico, and from the California Coast Ranges eastward to Nebraska. There are two forms that are sufficiently distinct to have been generally recognized by botanists and dendrologists as varieties of this species. The most widely distributed is the variety *scopulorum*, which occurs throughout the Rocky Mountains. The other is the variety *Jeffreyi*, considered by some to be sufficiently distinct to constitute a separate species.

To test the inherent vigor of these three forms, we obtained seed from 60 counties in twelve western states and British Columbia. To make possible a comparison of individuals as well as of geographic strains, the collections were made entirely from individual trees, which are marked with permanent aluminum tags. There are 765 of these mother trees, grouped in 126 field plots. The seeds gathered from each tree were sown in four different plots in the nursery, and our results are based upon the average of the four plantings. More than 73,000 measurements of the seedlings were taken to determine their comparative rates of growth under uniform conditions and thereby to obtain a true index of the inherent vigor of the parent trees.

The variety *scopulorum* was found to be uniformly weak in its hereditary constitution, with the one exception of the Arizona strain, which is fully as vigorous as many of the Pacific Coast forms. Throughout most of the Pacific Coast, *Pinus ponderosa* is of medium inherent vigor, although there are marked differences between different local strains. The most vigorous strain of all was found in El Dorado County, where three field plots earned an average vigor rating of 9, ratings being from one to ten.

The most interesting general tendency observed is that vigor seems to decrease definitely as elevation increases, at least in the Sierra Nevada. This is especially pronounced in El Dorado County, where the

most exhaustive tests have been made. All of the individual trees in this county that received a vigor rating of 10 are, with one exception, growing at elevations below 2,400 feet. All that received a rating of 9 are below 3,100 feet. All ratings of 4 are above 5,100 feet, and all ratings of 3 are above 6,300 feet. The trees of varying degrees of medium vigor are scattered over the central part of the county. From the viewpoint of reforestation, probably the most important of all vigorous trees revealed by the test, is one growing at an elevation of 3,700 feet, which received a vigor rating of 10. This one tree may prove to be the starting point of a new race that is both vigorous and hardy. Likewise of interest is a tree having a rating of 8 and growing at an elevation of 4,700 feet, where winters are severe. In connection with our progeny test experiment, marked differences have also been noted in the characteristics of cones, seeds and seed-wings of individual trees of the same species growing side by side in the forest.

The results have only recently become available and there has been little opportunity to ascertain the reasons for the conditions that exist. One of the simplest explanations is that the differences may be strictly a result of water supply, only the individuals that are inherently vigorous being able to survive the long dry season at the lower elevations. Temperature also may play a part.

The speaker illustrated his very lucid presentation by pictures, charts and models, and demonstrated a successful method of recording graphically the results of experiments. Altogether the lecture proved most interesting and instructive to his auditors. Seventy-five members and guests were present at the banquet and evening lecture.

DEATH OF DR. HARVEY MONROE HALL

It is the custom of the Carnegie Institution of Washington to hold an annual conference in December for the purpose of discussing reports of investigators on its staff and considering plans for future work. Dr. H. M. Hall, Associate in the Division of Plant Biology, went to Washington from Stanford University for this meeting in mid-December, 1931, and to deliver a lecture on "Environment versus Heredity", in connection with the program of lectures. Shortly before this lecture was to have been delivered he was taken ill, and his condition became increasingly serious. Three operations for abdominal abscess were resorted to in succession in an effort to save his life but without avail. He continued to sink and died Mar. 11, 1932.—W. L. J.

NOTES AND NEWS

On Thursday, December 10, 1931, a meeting of the California Botanical Society was held in Room 2093, Life Sciences Building, University of California. The paper of the evening was by Mr. H. L. Mason, Department of Botany, University of California, who gave an illustrated lecture upon "Collecting Plant Fossils on the Alaska Coast," with an account of the early spring vegetation of Alaska, the discovery of fossil redwood on St. Lawrence Island, native life and customs in the far north and the encounter of the ship *Northland* with the Arctic

ice-sheet. At the business session the following persons were nominated as officers, for the year 1932: President, Professor G. J. Peirce, Stanford University. First Vice-President, Professor H. E. McMinn, Mills College. Second Vice-President, Mr. H. L. Mason, University of California. Treasurer, Dr. David D. Keck, Carnegie Institution. Secretary, Ethel K. Crum, University of California. These nominees were duly elected at the following (January, 1932) meeting. Forty-two persons were present.

At Berkeley, on October 15, 1931, Mr. Cary Hill of the Forest Experiment Station, United States Forest Service, delivered a lecture before the monthly evening meeting of the Society on the subject: Changing ecological factors in California forests. The President, Professor Geo. J. Peirce, presided. Thirty-two members were present.

Dr. Jens Clausen, of the Royal Veterinary and Agricultural College, Copenhagen, Denmark, took up his duties at Stanford University as cytogeneticist on the staff of the Division of Plant Biology of the Carnegie Institution of Washington on November 1, 1931.

The following contributions from researches in the Onagraceae being conducted at Pomona College, Claremont, have been published recently: Revision of *Oenothera-Taraxia* and *Oenothera-Eulobus*, by P. A. Munz (Amer. Jour. Bot. 16: 246-257,—1929); Revision of *Oenothera-Sapingia* and *Oenothera-Calylophis*, by P. A. Munz (Amer. Jour. Bot. 16: 702-715,—1929); Revision of the North American Species of *Oenothera-Lavauxia* and *Oenothera-Megapterium*, by P. A. Munz (Amer. Jour. Bot. 17: 358-370,—1930); A Study of the Genus *Clarkia*, with Special Reference to its Relationship to *Godetia*, by P. A. Munz and C. L. Hitchcock (Bull. Torr. Bot. Club 56: 181-197,—1929); Revision of the North American Species of *Godetia*, by C. L. Hitchcock (Bot. Gaz. 89: 321-361,—1930).

The Carnegie Institution of Washington has issued a paper on the Pliocene floras of California by Erling Dorf (Publ. no. 412, pp. 1-108, 13 plates, 1930). It is an excellent piece of work based mainly on Coast Range fossil floras. Many new species of various genera, including *Pinus*, *Pseudotsuga* and *Cercocarpus*, are described. The leaf impressions of *Sequoia* from the Sonoma Petrified Forest are determined as *S. Langsdorfii* Heer; but are regarded as indistinguishable from the modern *S. sempervirens* Endl. The same institution has also published a paper by R. W. Chaney and H. L. Mason on "A Pleistocene flora from Santa Cruz Island" (Publ. no. 415, pp. 1-24, 7 plates, 1930), which is equally interesting and valuable especially on account of its treatment of coniferous material and comparisons with the living coastal flora and distribution of arboreal types.

TIA JUANA TO SAN JOSE DEL CABO—A BOTANICAL
EXPEDITION THROUGH LOWER CALIFORNIA

IRA L. WIGGINS

On April 2, 1931, accompanied by Professor James McMurphy as assistant, mycologist, and camping companion extraordinary, I crossed the international boundary at Tia Juana to drive the length of Lower California, collect material for the Dudley Herbarium, and make a brief reconnaissance of the peninsular flora. Despite exaggerated reports concerning the impassability of the roads due to recent cloud-bursts we experienced comparatively little difficulty in negotiating the primitive roads and reaching San José del Cabo at the southern tip of the peninsula.

A number of plants were too immature for herbarium specimens when we passed them on the southward journey and were noted for more detailed attention on the return trip. Unfortunately we lost nearly three weeks at San José del Cabo and a great many of the plants so noted had to be neglected on the return trip as the time remaining was very limited. Then, too, a number of them had already passed the flowering or fruiting stages we wished to secure. The latter was particularly true of some of the cacti. However, we obtained a fair representation of the plants in condition to collect at the time we visited the various localities.

The vegetation of Lower California differs little from that of southern California over most of the first two hundred and twenty-five miles. South of the border there are a few species which do not reach the United States, and these give a slightly different aspect to the landscape, the number of such species materially increasing as one travels south. A number of others that are rare in California become more abundant in Lower California. Among the latter is *Bergerocactus emoryi*, rare in California. A few small colonies of this interesting cactus are growing on Santa Catalina and San Clemente islands. Twenty years ago it was rare but still present in the vicinity of National City in San Diego County, but cactus enthusiasts have nearly, if not completely, wiped it out in that locality. Fifteen miles south of Tia Juana the contrast is striking, for here it is present in abundance and for a distance of over two hundred miles one seldom loses sight of it on the coastal slopes and mesas. *Machaerocereus gummosus*, the "Pitahaya agria" of the Mexicans, is encountered along the coastal bluffs a short way north of Ensenada and is common in the coastal region from there south to the tip of the peninsula. *Myrtilocactus cochal*, the fruit of which is highly prized by the natives, is common from Cabo Colnett southward and occurs sparingly as far north as Ensenada.

Aesculus parryi is a conspicuous shrub, during the spring, from a little ranch thirty miles north of Ensenada southward almost to the ruins of Mission San Fernando. The leaves are silvery-tomentose on the

lower surface and brighten the grays and dull greens of the landscape with flashes of silver when light winds stir the foliage. A few miles south of the border *Agave shawii* becomes abundant, and numerous species of this genus are conspicuous over a great part of the peninsula. The young flower stalks of almost every species are used for food or in the manufacture of mescal. In this same region the scarlet flowers of *Galvezia juncea* add a touch of bright color and an enormous *Dudleya*, which may be *D. pulverulenta*, is conspicuous on the basaltic cliffs of the mesas and arroyos. *Cneoridium dumosum* and *Simmondsia californica* are much more plentiful than they are in San Diego County, and the flowers of *Rhus integrifolia* are a brighter deeper rose than they are north of the international boundary line.

From Tia Juana to Rosario, a distance of 236 miles, the road is never more than a few miles from the coast, but at the latter village it swings eastward toward El Marmol, an onyx-mining town about two-thirds of the way across the peninsula. A short distance eastward on this road a change of marked degree begins to manifest itself in the flora. *Adenostoma fasciculatum* disappears from the hills as its southern limit is on the south flanks of the Sierra San Pedro Martir. *Arctostaphylos bicolor* is seen only near the coast, *Pachycereus pringlei* no longer occurs as scattered specimens only, but forms extensive forests. *Yucca valida*, *Viscainoa geniculata*, and *Idria columnaris* put in their appearance and from the vicinity of El Marmol southward most of the peninsula is occupied by the Lower Sonoran flora.

We paid particular attention to the southernmost extension of the range of a number of the species found in southern California, and found that the majority of them do not extend beyond the southern tip of the Sierra San Pedro Martir, and a considerable number seems to drop out before this point is reached. *Ribes malvaceum* was not seen south of Santo Tomas; *Allium praecox* and *Dichelostemma capitatum* were collected between Rosario and San Fernando but not seen south of that point. *Muilla serotina* was found near the mouth of San Antonio del Marr Canyon (Johnson's Ranch), and *Bloomeria crocea* on the Santa Maria Plains twenty miles or so south of San Quintin. *Quercus dumosa*, *Adenostoma fasciculatum*, *A. sparsifolium*, *Heteromeles arbutifolia*, *Arctostaphylos glauca*, *A. drupacea*, *Juniperus californica*, and *Pinus quadrifolia* reach their southern limits at approximately the same point near the southern tip of the Sierra San Pedro Martir. *Arctostaphylos bicolor* disappears from the foothills of the mainland but reappears on Cedros Island, while *Heteromeles arbutifolia* is again present in the mountains of the Cape Region.

In the higher mountains of the Sierra San Pedro Martir occur the southernmost known limits of *Pseudotsuga macrocarpa*, *Pinus lambertiana*, *P. jeffreyi*, *P. contorta murrayana*, *Libocedrus decurrens*, and *Quercus chrysolepis*. *Populus tremuloides* and *Abies concolor* reach the southernmost extension of their peninsular range here, but occur somewhat further south on the mainland of Mexico. *Rhus laurina* disappears near San Quintin, and *R. integrifolia* is plentiful to a point

about half way between Rosario and San Fernando. *R. laurina* reappears in the Sierra San Francisquito, near La Paz. *Fouquieria splendens* gives way to *F. peninsularis* in the vicinity of Punta Prieta, and a yucca without flowers or fruit which appeared to be *Y. mohavensis* was seen intermingled with *Y. valida* some miles to the north of this place.

For a distance of about thirty-five miles south of El Marmol Idria is the most conspicuous tree of the low hills. Growing among huge granitic boulders carved into fantastic shapes by the action of wind and changing temperatures, it gives the entire area a weird aspect suggestive of primitive forests tenanted by monstrous saurians. The smooth bark varies from a light yellowish green to nearly white and is nearly two inches thick. The woody skeleton of the plant is a dictyostele with the perforations arranged rather closely in indefinite spirals. The woody cylinder is only two or three inches thick and surrounds a pith that may be a foot in diameter at the base of the larger trees. The pith is quite juicy and has a sweet taste accompanied by a decided bitter tang that becomes stronger as the pulp is chewed. During years of light rainfall and short feed thousands of the "Cirio" trees, as the Mexicans call them, are cut down, split open with a few blows of an axe, and left for the cattle to dig out the pith which they eat greedily.

At Cataviñá, thirty miles south of El Marmol, are two canyons where two species of native palms occur. The tall, graceful stems of *Washingtonia filifera gracilis* and the shorter trunks of *Glaucotheca armata* crowned with leaves a yard broad afford a pleasant change from the monotony of the Idria and *Pachycereus* forests of the neighboring hills. These palms also occur in a canyon some twelve miles south of Cataviñá. Travelers fill all available water containers at this canyon, for ordinarily there is no water between there and Punta Prieta, 85 miles south.

We filled our canteens and water-can, but there was plenty of water at Laguna Seca Chapala, which is usually a flat plain five miles across without a drop of water in sight. Ordinarily one drives straight across it as rapidly as the condition of the "road" permits, for the tires sink into the ash-like silt and send up clouds of choking dust. But in February a cloudburst had drenched the surrounding hills and turned the "dry" lake to a decidedly wet one several feet deep. We were forced to detour about five miles around the upper end of the lake over a jumble of jagged granite rocks varying in size from chunks as small as a man's head to some as large as a good sized wash tub. Nearly three hours were consumed in negotiating that detour, for in a number of places some of the worst rocks had to be rolled out of the way. On the nearby hills the commoner shrubs are *Covillea tridentata*, *Prosopis pubescens*, *Elaphrium microphyllum*, *Fouquieria splendens*, several species of *Lycium*, and the ever present *Pachycereus*, *Ferocactus*, and *Opuntia cholla*.

Splendid collecting was found on the desert hills and sand dunes about half way between Laguna Seca Chapala and Punta Prieta. Abro-

nias filled the air with fragrance and covered acres with masses of delicate tinted blossoms. *Yucca valida* was conspicuous. *Pachycereus* was plentiful. *Ephedra* was in full bloom. *Cenchrus palmeri* made kneeling extremely painful and was literally a thorn in the flesh far too often, for in the excitement of collecting some fine specimen not previously seen it was very easy to forget the thorns and drop on one knee or incautiously place eager fingers on the vicious burs. A large number of herbaceous annuals kept us occupied for several hours, despite the fact that we had been told by a cactus collector, Mr. Howard E. Gates, that collecting would be poor south of Cataviñá. About a mile north of Punta Prieta we found our finest specimen of *Pachycereus pringeli*, a monarch fifty-five feet tall. At about the same place we encountered *Fouquieria peninsularis*. It has a deeper red corolla than has *F. splendens*, but the flowers make a poorer display because the panicles are much smaller than those of the northern species.

Punta Prieta is an abandoned mining town and its population varies almost overnight from zero to fifteen or twenty people. Mexicans move into the deserted adobe houses where they stay while the men hunt antelope and deer in the neighboring Sierra de San Borjas, or prospect in that range and the Sierra Columbia toward the west. They seldom stay long for the water is so heavily impregnated with salt and alkali, to say nothing of other minerals, that we wouldn't use it in the radiator of the Ford!

There is little change in the flora from Punta Prieta southward almost to Calmallí. A few miles north of Calmallí the last struggling specimens of *Idria* reach their southern limit. *Viscainoa* is plentiful along some arroyos, and the "forest" of the desert plains is made up almost entirely of cactus. *Pachycereus*, *Lophocereus*, *Lemaireocereus*, *Opuntia*, *Echinocereus*, and *Ferocactus* compose a large part of the flora. *Elaphrium* grows among the cacti, and *Acacia*, *Pithecolobium*, and *Prosopis* line the arroyos.

Ten miles south of Calmallí we saw our first specimen of *Ibervillea sonorae*, a peculiar cucurbit with a huge subterranean stem. Another ten miles south we collected *Marsilea* in abundance within ten feet of the base of a healthy specimen of *Pachycereus pringlei*! The margin of the dried up rain-pool had extended some yards past the cactus but apparently its feet had been soaking for such a short period that no ill effects resulted. Vernal pools do not last long in this region of rapid evaporation.

At San Ignacio a small stream is fed by a fine spring a short distance up the canyon above the town. Dates, grapes, bananas, a little sugar cane, and a few oranges are grown in the narrow valley, and all of the ground for which water is available is cultivated. The valley is a picturesque spot, for it is the first oasis south of Rosario, 328 miles to the north. The hills on both sides of the valley are dry and barren, supporting scanty growths of scrubby "chollas," "cardons," "palo fiero," "mescal," and "torote." Two miles up the canyon the earth is as parched as the hills on either side of the valley, and a few miles down the canyon to the west the water again disappears leaving it a "dry and thirsty land."

The hills between San Ignacio and Santa Rosalia are of volcanic origin and the lava flows that coursed down the slopes of Las Tres Virgenes in 1784 are still hideously raw and rugged. A few torote trees (*Elaphrium*), two or three species of *Agave*, and a few spiny leguminous shrubs do a little toward softening the harshness of their profiles, but several centuries more must pass before these inhospitable rivers of rock take on the gray-green mantle of the adjacent land which escaped the recent devastating heat of the Three Virgins. It is a hot, monotonous, desolate region, and in the immediate vicinity of Santa Rosalia is made more desolate by the fumes from the copper smelters.

Forty-two miles south of Santa Rosalia, at Mulegé, *Rhizophora* mangle grows along the estero, sugar cane, corn and melons thrive in the rich valley soil, and date palms, banana trees, and coconut trees give the sleepy little town an exotic, tropical charm hardly equaled anywhere else on the peninsula. In September of this past summer extraordinary high tides coming at the same time that the water from a cloudburst in the mountains rushed down the narrow valley almost completely demolished over half of the village of Mulegé. The adobe buildings melted down almost as rapidly as wet sugar when half submerged by the high water. The mountains in this vicinity, though not high, are exceedingly rugged volcanic peaks and little is known of their flora. *Lysiloma candida* is a striking tree of the lower canyons, the smooth bark glistening as though white-washed, and many of the trees show the devastating effects of the tanbark harvesters who shipped hundreds of tons of the bark from Santa Rosalia a few years ago.

From Mulegé the road leads one southward past the beautiful waters of Bahia de la Concepcion, past Canipole where good water is obtainable, and over steep, rocky, narrow grades and across lava strewn plains to Comondu. A native fig, *Ficus palmeri*, is a conspicuous tree on the rocky walls of the narrow canyons, the flattened roots clinging to the naked rocks or dropping in stringy cascades thirty or forty feet over precipices in search of scanty moisture in tiny crevices below. The same crops, excepting the coconuts, are grown at Comondu as at Mulegé. The townsfolk were in the midst of manufacturing their annual supply of "panoche," the dark brown native sugar, at the time of our arrival. *Pithecolobium dulce* is grown for a shade tree and for the fruit, and *P. confine* is common along the arroyos. The seeds of the latter species are ground after roasting and used as an adulterant in coffee or to impart a peculiar flavor to chocolate. According to the natives, the young pods are used to make ink by soaking them in water for a few days. The resulting dirty brown fluid is hardly comparable to our inks. *P. confine* is one of the many shrubs called "palo fiero" in Baja California.

For the most part, the road from Comondu to La Paz skirts the monotonous Magdalena Plains, where the shrubs are mostly small, thorny, and scattered. *Euphorbia misera*, *Pedilanthus macrocarpus*, *Yucca valida*, *Pachycormus discolor*, *Fouquieria peninsularis*, several species of thorny leguminous shrubs and a number of cacti strike the

dominant note in the landscape. *Gossypium harknessii* occurs at a few points along the coast where arroyos carry water to the ocean during the rainy season. The creeping stems of the peculiar *Machaerocereus eruca*, or creeping evil cactus, cover extensive areas, and a few small composites add a touch of color to an otherwise drab expanse of dusty gray.

In the vicinity of La Paz, and from there south to the tip of the peninsula, the country gives evidence of a heavier rainfall. The vegetation is that of a tropical semi-desert area, and the vegetation is heavy only in the better watered valleys. From Ribera to San José del Cabo the summer rains bring up a thick growth in a surprisingly short time, according to the reports of others who have visited the area after the rains, but it was dry and rather uninteresting in May, the very end of the dry season. Throughout this region *Tecoma stans* is common along the washes and bears gorgeous masses of bright yellow flowers during April and May. *Lysiloma candida* is abundant, forming nearly pure stands in the mountain canyons. *Operculina aurea*, a yellow-flowered morning-glory, clambers over the shrubbery and vies with *Tecoma stans* in brightening the hillsides and arroyos. *Pachycereus pecten-aboriginum*, with its huge, burr-like fruits, is commoner than *P. pringlei*, and *Lemaireocereus thurberi* is common. *Pithecolobium dulce* and *Enterolobium cyclocarpus* are used as shade trees about the towns, and the trunks of the latter are used for making their dugout canoes.

Sugar cane, coconuts, dates, papayas, mangoes, melons, and bananas grow well. Frost is unknown in the lowlands and a variety of smaller crops are cultivated wherever water for irrigation is available. Several thousand acres in the vicinity of San José del Cabo, Ribera, and Eureka are planted to tomatoes annually and the crop shipped to the United States to supply the early market. In the Cape Region the climate is said to be delightful during all parts of the year except during the rainy season which extends from late June to the early part of September.

Excepting the Cape Region and the higher mountains of the northern part of the peninsula. Lower California is desert or semi-desert in character. Most of the shrubs are thorny, some have a very bitter taste or a disagreeable odor, and others combine two or more of these characters. Many of them, however, offset these objectionable features by the beauty or fragrance of their flowers, and some of them produce abundant food for man and beast. The peninsula boasts a considerable number of endemic genera and species, some of the former of which are *Pachycormus*, *Viscainoa*, *Machaerocerus*, *Xylomagra*, and *Clevelandia*. The number of endemic species is much greater.

Life zones from Arid Tropical to a scant representation of the Canadian Zone occur on the peninsula, consequently the flora is very diverse and presents numerous fascinating problems in geographical distribution, zonal range of critical species, and the probable centers of origin of the various elements making up the total flora. The vast expanse to be covered makes it difficult to obtain a comprehensive view

of the flora and the environmental factors operative in the area. The fluctuations in climatic conditions from one year to another add to the difficulty of securing complete collections within a reasonable period of time. But with all of the discouraging features connected with a careful survey of such a large area, Baja California, with its diverse, problematical flora, holds a strong attraction for the field botanist.

This trip, extending from April 2 to June 6, 1931, as well as three previous shorter trips into Lower California, was made possible by the interest and generosity of Mr. H. C. Dudley, of Duluth, Minnesota, and Mr. E. G. Dudley, of Exeter, California. Their aid is greatly appreciated and I wish to acknowledge my sincere thanks for their continued interest. Thanks are also due and gladly given to the Mexican Consul General at San Francisco, the Mexican Consul at San Diego, and numerous Customs Officers at various towns in Baja California, for the many courtesies extended us and for numerous aids in securing necessary permits. Señor Arturo Canseco, a prominent merchant in San Jose del Cabo, earned our lasting gratitude during the time we stopped there.

Dudley Herbarium, Stanford University.

RAINFALL PREDICTIONS FOR CALIFORNIA, SEASON OF 1931-1932

In October, 1931, an announcement was made by Dr. Geo. F. McEwen and Dr. A. F. Garton of the Scripps Institution of Oceanography that California would probably have a drier winter than normal this year. Their prediction was based on a study of records of Pacific Ocean temperatures which indicate that offshore water temperatures higher than average are followed by winters drier than average and conversely lower temperatures indicate wet winters. The offshore temperatures for 1931 have been markedly above average. This fact, in connection with the low point position of the 1931-32 season in the Bruckner precipitation cycle of 22 to 32 years, led to the belief that the season would be "dry."

Fortunately for California industrially and in other ways, precipitation records for the season on March 15, 1932, were above normal at all six stations south of San Francisco Bay whose records are commonly circulated by the United States Weather Bureau and much above the lows of recent years at the four stations in California north of San Francisco Bay as published daily in the press by the Weather Bureau.

On account of the great biological significance which attaches to precipitation records for California a study by H. B. Lynch, Consulting Engineer of the Metropolitan Water District, Los Angeles, published August, 1931, has interest for botanists. His paper, which is based on mission and other records as to weather, crops, droughts, floods, ice and snow, is entitled "Rainfall and stream run-off in Southern California since 1769". From the discussion in this paper one seems driven to the inference that we have not yet, at this time, reached the low point in our present series of drought years, which form only

a part of a long-period deficiency cycle. The summary of his conclusions are as follows: "1. There has been no material change in the mean climatic conditions of Southern California in the past 162 years. 2. There have been earlier fluctuations from average rainfall conditions, however, both excesses and deficiencies, of greater magnitude than any which have occurred in the past forty years. 3. The twenty-eight year period of rainfall deficiency which ended in 1810 was about as severe as has been the present one to date, and much more protracted. 4. The period of rainfall surplus from 1810 to 1821 was more intense than anything in the past forty years. It seems to have been about as intense as was that between 1883 and 1893. 5. The period of rainfall deficiency which lasted from about 1822 to 1832 was more severe than has been any occurring since. 6. The period of rainfall deficiency which commenced in 1842 and lasted until 1883 was much longer than any other of which we have record. It was not so acute, however, as some others, both earlier and later. It was broken by a period of normal rainfall, but was without any period of excess rainfall to balance the deficiency. 7. In comparison with several periods of rainfall shortage which have occurred in past years, the present rainfall deficiency to date cannot be considered a major shortage. 8. For all practical purposes the useful water yield of the areas under consideration closely approximates the run-off from the principal streams of these areas, except in times of heavy floods. 9. The run-off from Southern California streams has in general shown fluctuations from the normal similar in character to those of the rainfall, but larger in relative percentage. 10. By reason of these fluctuations, the useful water yield has at various times been reduced from the average by considerably more than one-half for a period of ten years, and by thirty per cent for a period of twenty-eight years."—W. L. JEPSON.

NOTES AND NEWS

Mr. H. L. Mason delivered a lecture at the California Academy of Sciences on the evening of November 4, 1931, at San Francisco on "The history and migration of the Monterey pine forests."

The annual year book of the Santa Barbara Museum of Natural History for 1931, recently issued, contains a report of the Blakesley Botanic Garden and other general data, as well as several good illustrations.

Dr. Geo. J. Peirce of Stanford University was elected President of the Botanical Society of America at the December, 1931, meeting in New Orleans.

"Vegetative changes and grazing use on Douglas Fir cut-over land" by Douglas C. Ingram, is a United States Forest Service publication. This paper is of interest to botanists. It discusses especially the changes in species and groups under the influence of grazing (*Jour. Agr. Res.* vol. 43, no. 5, 1931).

NOTE ON THE GENUS KRAMERIA IN CALIFORNIA

WILLIS LINN JEPSON

It has been known for long that the genus *Krameria* is represented in California by two desert species. *K. parvifolia* Benth. and *K. Grayi* Rose & Painter (*K. canescens* Gray.). These two species parallel each other closely, the differences being essentially complementary. While the features of unlikeness as usually indicated in texts are few and relate to the number of bracts on the pedicels (a somewhat variable character) and the distribution of the barbs on the spines, there are, aside from these points, other valuable differentiae. In *Krameria parvifolia* the sepals are ascending, with the result that the flower presents an aspect different from that of *Krameria Grayi*. In the latter species the sepals are somewhat reflexed or recurving, or at least spreading, the lateral pair curving backwards and upwards in such a way as to approximate the backward-curving upper pair, while the lower sepal is descending. In the two species the pairs of glands on the lower side of the flower occupy the same position and are similar in size but unlike in detail. In *Krameria parvifolia* the gland consists of a series of laterally united cylindric processes which may be likened to a sort of flattened Roman fascis. In *Krameria Grayi* the gland is circular, flattened, all over regularly papillose and very shortly stalked on the under side. In both species the glands are purple. In their leading characters the two species are very similar in every way and make a well-marked and closely distinctive aggregate. This fact has interest in connection with the geographic range. *Krameria Grayi* occurs in both the Colorado and Mohave deserts and ranges east to New Mexico and south to old Mexico and Lower California. *Krameria parvifolia* has the same distribution unless it be less widely distributed in old Mexico.

In a more recent period another species, *Krameria glandulosa* Rose & Painter, based typically on specimens from El Paso, Texas, has been recognized as growing in the California deserts. By J. F. Macbride this was reduced to varietal rank under *Krameria parvifolia* in 1918 (*Contrib. Gray Herb.* 56:52). In the eastern Mohave Desert several new stations for *K. glandulosa* have lately been reported by Miss Mary Beal, a plant lover dwelling in the midst of the desert. If the habit of the shrub is markedly distinctive as pointed out by Miss Beal, this feature in connection with the flower characters may justify the retention in specific rank of *K. glandulosa*. The peduncles and outer sepals are stipitate-glandular and the ovary glands are crimson.

THE VISIT OF THE RURIK TO SAN FRANCISCO

A publication from the Stanford University Press by August C. Mahr is entitled: *The Visit of the "Rurik" to San Francisco in 1816*. Though written for historians this book of Dr. Mahr will prove very interesting to botanists, too, particularly those of the San Francisco

Bay region. All the historical documents concerning the visit of the "Rurik" under Captain Kotzebue to San Francisco Bay are given in translation and in the original and to make it more complete, the various reports of the scientific material collected about San Francisco during the vessel's stay are included. The plant collections were made by Chamisso and Eschscholtz, scientific explorer and surgeon respectively, of the expedition. The fact that some of the source books in which these reports appear are not readily accessible in the west makes the book much more usable. An attempt has been made to check the plant lists with Dr. Jepson's Manual that the determinations of more than a century ago might be more understandable. Several contemporary illustrations are reproduced, including the plate of *Eschscholtzia Californica* Cham.—ROXANA S. FERRIS.

FIELD WORK ON ERYTHRONIUM

Mr. Elmer I. Applegate has outlined a schedule for field work in 1932 to be undertaken in connection with his taxonomic study of the genus *Erythronium*. The members of this genus are variously called adder's tongue, dog's-tooth violets and fawn lilies and their study has been Mr. Applegate's hobby for some thirty-five years. This spring he expects to make trips into the foothills of Lake County and then along the Sierra Nevada as far north as the coastal ranges of southern Oregon. This summer he projects a journey to the habitats of *Erythronium* in Utah and Colorado. By the end of the present collecting season Mr. Applegate expects to have gone over the entire range of the genus in North America, for in preceding seasons he has followed equally extensive programs of exploration. In 1931 Mr. Applegate collected through Oregon, Washington, Idaho and British Columbia, and in 1930 he visited Idaho, western Montana and northwestern Wyoming.—DAVID D. KECK, Mar. 17, 1932.

OPEN LETTERS

The Hanna Oak¹

This tree of *Quercus agrifolia*, which stands four miles west of Gilroy, was measured May 20, 1923, and again in January, 1932. At five feet above the ground the trunk circumference in 1923 was 27 feet, 6 inches, at eight feet it was 30 feet, 9 inches. At exactly the same heights the respective circumferences in 1932 were 28 feet, 1 inch and 31 feet, 3 inches. The trunk has therefore grown about a half foot during a period of "dry" years with one infestation of caterpillars that denuded the tree of all its foliage.—W. J. HANNA, Gilroy, Feb. 7, 1932.

Quercus lobata in Round Valley, Mendocino County

The Henley Oak which is located on the ranch of the Round Valley Land Co., 3 miles south of Covelo, was measured by the then manager of the ranch, J. B. Bellatti, in 1925, 28 years after Dr. W. L. Jepson

¹A name given to this individual of *Quercus agrifolia* by W. L. Jepson. Cf. Madroño, vol. 1, p. 226.

measured it. Mr. Bellatti's figures are as follows: height, $175\frac{1}{2}$ ft.; greatest spread, 120 ft.; circumference at ground, 41 ft.; diameter at ground, 13 ft. 8 inches; circumference four feet above ground, 27 ft., 3 inches; height to first fork, $17\frac{1}{2}$ ft.—EDITH V. A. MURPHEY, Jan. 8. 1930.

Ferns in the Santa Cruz Mountains

A few days ago I mailed you a very interesting form of *Cystopteris fragilis*. This location was two miles west of Saratoga near a long bridge. The elevation was between five and six hundred feet. On a ledge of rocks in the same location I found a form that I take to be *Woodsia scopulina*. Is it not out of its usual habitat?—R. J. SMITH.

Adiantum pedatum at a high altitude station

In the summer of 1931 while camped at Reflection Lake on East Creek on the south fork of King's River, I chanced into a station for *Adiantum pedatum* at an elevation of approximately 10,300 feet. This colony of ferns was found on the west slope of the mountain at a point about due west of the outlet of Reflection Lake, about 150 feet above the elevation of the lake. The plants were growing in a large crevice that had water dripping down it, the only shelter from the direct sun rays being the rocks that overhung the crevice. The growth was very vigorous and the plants looked extremely healthy. I think this discovery will establish a new altitude record for this fern.—R. WHALLEY, San Francisco, Oct. 2, 1931.

Sequoia gigantea in the County of Sussex, England

Since I saw you [at Gravetye] my good man Markham, the gardener, has been looking around and has found a very nice place to make a wood of your big tree. I am perhaps one of the few that group things and plant in the forest way, whereas in so many places here the work is done in dots. Well, the end of this was, we found a very nice piece of ground and had it put in order and then couldn't find the plants. Our nurseries here, and in France, too, I find, do not treat it as a forest thing at all, but make a fetish of it and charge accordingly, and do not increase it after the manner in which your ordinary trees are sold by the nurseries. The curious thing is that the *Sequoia* [*gigantea*] is absolutely as hardy here as the oak tree and grows beautifully. If in your nurseries they take a different view as to propagating, I might be glad to hear of it, and suppose that it would not be very difficult, assuming that we can get the plants, to ship them over here.—W. ROBINSON, Gravetye Manor, East Grinstead, Sussex, England, January 9, 1931.

A stock of seedlings of *Sequoia gigantea* was shipped to Mr. Robinson from a California nursery in April. The big tree of California has been grown in England as a specimen tree in parks and gardens for now near eighty years, but this may possibly be the first time in that country that a plantation or little forest of it has been established.—W. L. J.

Torreya Californica in Santa Cruz County

There is a California nutmeg tree growing on Scott Creek, Santa Cruz County, which is 6 feet, 4 inches in diameter at 5 feet from the ground; it is 6 feet in diameter at 8 feet from the ground. Do you know of any larger tree of this species? There is also a tree one half mile farther up the creek which is 4 feet, 4 inches in diameter at 3½ feet above the ground.—C. A. REED, October 4, 1932.

Torreya Californica in the North Coast Ranges

I have seen the California nutmeg on the mountain [of St. Helena] and in the hills west of Knights Valley (but it is not common), and also on Sulphur Creek between the little and big geysers in the region of Geyser Peak. There is a fair sized tree growing at Carl Purdy's "Terraces" east of Ukiah. It is in the open and is comparable to a fir, for it is straight and perhaps thirty-five feet high.

In August of 1923 I rode from Cedar Camp on Goat Mountain to Upper Lake in one day, leading a mule, and crossed the upper valley of Twin Valleys along the telephone line and followed the crest of the Bartlett Mountain ridge toward Elk Mountain and came out on a road that runs from Upper Lake Valley to Pasmore Springs. Following this road toward Upper Lake I traveled level for about a quarter of a mile on the north side of a ridge, and here (along the roadside) I saw what at that time were the largest nutmeg trees I had ever seen. However, they are not so large as the tree I saw at Purdy's Terraces last year, being rather thin, not so tall, and standing in a forest on poorer ground.

Had I had time this last fall or earlier in the winter I would have liked to go and get specimens of a shrub of which I have heard, just for the pleasure of experimenting in a horticultural way. Lake County friends from that Long Valley east of Clear Lake told me that the Indians there go in the fall to the Bear Valley Mountains and bring back a dried fruit similar to a date, except that it is only about half as big and is kind of grainy or mealy in texture. This fruit, they say, grows on a shrub or bush, and the Indians call it "munz".—DAVID S. HOLMES, Knights Valley, Sonoma Co., Mar. 1, 1928.

NOTES AND NEWS

Dr. James William Toumey died May 6, 1932. He was professor of botany at the University of Arizona from 1892 to 1898, later going to the Yale Forest School where he has been professor of silviculture since 1910. He was a man of high character and an excellent scientist.

The name of the Eddy Tree Breeding Station at Placerville, California, has been changed to the Institute of Forest Genetics. Mr. Lloyd Austin is the director.

Mr. Theodore Payne of Los Angeles, an old-time cultivator of native annuals, has recently issued a new edition of his "California Wild Flower Seeds".

During the ten-year period from 1922 to 1931 there were reported 34,407 forest fires in California. Of these tobacco smokers caused 10,133 according to the United States Forest Service, lightning 6,195, incendiaries 4,574, campers 2,321, railroads 1,415, lumbering 1,038, while 3,748 fires are classified as miscellaneous.

The Templeton Crocker Expedition to the Galapagos Islands, which left California on March 10, 1932, put in at San Diego August 23 on its return voyage, reaching San Francisco, the home port, on September 1. The expedition was a highly successful one. The botanist was John Thomas Howell, Assistant Curator in the Herbarium, California Academy of Sciences.

The goat grass, *Aegilops triuncialis* L., has in recent years become established as a serious pest in the grazing foothill lands of Eldorado, Sacramento and Calaveras counties. Observations of it and collections have been made by Fred P. Cronemiller, now Supervisor of the Modoc National Forest. It has also been found sparingly in San Joaquin and Stanislaus counties. L. S. Smith, Grazing Examiner, Tahoe National Forest, has also collected this species in Eldorado County. It is a native of Europe and by most European grass authorities is referred to the genus *Triticum* (wheat) as *T. triunciale* Rasp.

Dr. Albert Schneider, formerly professor of botany in the College of Pharmacy of the University of California, died in Portland, Oregon, in 1928.

"A Revision of the Genus *Menodora*" by J. A. Steyermark and "A Monographic Study of the Genus *Lycium* of the Western Hemisphere" by C. L. Hitchcock appear in the *Annals of the Missouri Botanical Gardens*, vol. 19 (1932). In *Lycium* 45 species are recognized and illustrated by 13 plates.

Mrs. Ynes Mexia, a member of this Society, returned to California on March 21, 1932, from a collecting trip which extended across South America from the Atlantic to the Pacific. Leaving San Francisco on October 16, 1929, Mrs. Mexia went to Vicosia, Brazil, which she made her headquarters for over a year. Diamantina, the classic collecting ground of Martius, was next visited, then Belen at the mouth of the Amazon River. Traveling by boat up the Amazon she arrived at Iquitos, Peru. From this point she made a side trip by canoe through the gorge of the Amazon, remaining for several months among the native tribes of the region of Pongo de Manseriche. From Iquitos over the Andes the journey was made by airplane, automobile and railroad to Lima, Peru. From Lima Mrs. Mexia traveled by boat to Balboa where she embarked for home. The collection comprises about 60,000 specimens, including about 3,000 numbers. On June 1 before the California Academy of Sciences Mrs. Mexia gave a lecture entitled: *Up the Amazon and Over the Andes*. This lecture will be repeated on October 19, as the first of the fall series of public lectures sponsored by the Academy.

Between June 9 and July 15, 1932, Dr. W. A. Setchell of the Department of Botany, University of California, and Mrs. Setchell, collected in Alaska 350 numbers of *Salix*, representing about 24 species and 15 varieties. The route traversed extended from Ketchikan north to Fort Yukon, southwest to Holy Cross and south to Seward. Considerable collecting was done in the general regions of Fairbanks and McKinley National Park.

According to Section 384a of the Penal Code of California it is against the law to cut or destroy any native tree, shrub or fern along state and county highways or on any private land without the written permit of the owner. In addition to this a number of counties, especially in Southern California, have special ordinances protecting various species of native herbs.

Mt. Diablo, the most striking landmark of the central Great Valley, is being acquired by the California State Park Commission as a state park under a plan of purchase. The mountain has been visited by botanists for about seventy years and is interesting on account of its isolation, its varied vegetation and a few rare endemics which inhabit its summit. It is a matter of congratulation, that the present members of the Park Commission are disposed to preserve the mountain in its present natural state as near as circumstances will permit.

On July 21, 1932, while collecting plants on San Miguel Island, Mr. Ralph Hoffman, Director of the Santa Barbara Museum of Natural History, fell from a cliff and was killed. It is said that he used his trowel in climbing and apparently the trowel broke, causing his fall. The Santa Barbara Museum has prospered under his administration and the loss to the city is very great. One of his activities centered around the herbarium which he planned should represent adequately and fully the native plants of the Santa Barbara region. In the genus *Eriogonum* he took an especial interest and had collected in the back country a considerable number of new and interesting forms in the last four years.

Harvard University conferred in 1931 on Rimo Bacigalupi, a member of this Society, the degree of Doctor of Philosophy. Dr. Bacigalupi's thesis is entitled: A monograph of the genus *Perezia*, section *Acourtia* [Contrib. Gray Herb. no. 97].

An excellent annotated list of cacti and other succulents cultivated in the Santa Barbara region has been issued under the auspices of the Community Arts Association of Santa Barbara. The list has been compiled by Ralph Hoffmann, E. O. Orpet, Eric Walther and James West, and edited by Pearl Chase. It forms a book of 107 pages which is well arranged, admirably printed and finely illustrated. In California, Santa Barbara has always taken the lead in the introduction, culture and study of ornamental exotics, and it is interesting to observe that fine traditions are being upheld and strengthened. (929 Paseo Carillo, Santa Barbara. \$1.00.)

"The forest that fire made," by S. W. Greene, discusses the role of fire in the Southern states, especially Mississippi (American Forests, vol. 37, pp. 583-584, 618).

Dr. David D. Keck of the Carnegie Institution has published the first part of his "Studies in Pentstemon" under the title, A systematic treatment of the section *Saccanthera*. It is illustrated by eighteen figures and will be followed, doubtless, by other parts equally intensive (Univ. Cal. Publ. Bot. vol. 16, no. 11, Feb., 1932).

A biography of Samuel Bonsall Parish by W. L. Jepson has been issued by the University of California Press (Univ. Cal. Publ. vol. 16, no. 12). The publication carries a portrait, bibliography and also a list of Mr. Parish's botanical journeys.

The area of magnificent sugar pines (*Pinus Lambertiana*) along the Big Oak Flat road to Yosemite in the neighborhood of Carl Inn was originally a part of Yosemite Park but has since been excluded, and this forest, now in private possession, will be logged. This situation is feelingly described in a well-printed and beautifully illustrated pamphlet entitled "The doomed Yosemite Sugar Pines," which is being circulated from New York City by the "Emergency Conservation Committee." The Committee solicits donations "however small" for its campaign to save these trees. It is noteworthy, however, that the appeal is made without any names as sponsors whatsoever.

The history of fire in the Redwood belt and the use of fire in logging operations is profitably discussed by Emanuel Fritz in a paper "The Role of Fire in the Redwood Region" (Univ. Cal. Agr. Exp. Sta. Circ. 323). A copy may be had from the College of Agriculture, Berkeley.

The annual exhibition in mid-December, 1931, of the Division of Plant Biology of the Carnegie Institution at Washington, was presented by Mr. W. M. Heusi of the Stanford laboratory. Mr. Heusi later repeated the exhibit at the American Association meetings in New Orleans. Living *Zauschneria* plants were used to illustrate how far environmental conditions on the one hand and heredity on the other controlled the character of their leaves. Dr. John Belling, now at the University of California, also exhibited at Washington for the Division of Plant Biology with models of chromomeres of *Lilium*.—DAVID D. KECK.

Lester Rountree's "California Wild Flower Seeds" list no. 7 is circulated as "the world's largest collection of wild flower seeds." The publication states that the company will neither personally collect nor handle for commercial sale native California plants dug from wild stands. (Carmel, California.)

Among lately received reprints from the Annals of the Missouri Botanical Garden are two of special interest to California botanists. A Monograph of the Genus *Sidalcea* by Eva M. Fling Roush (Ann. Mo. Bot. Gard. 18: 117-244,—1931) treats the history, morphology, relationships, and taxonomy of the genus. Twenty species are recognized, fifteen of which occur in California. A Revision of the Genus *Frasera* by Hamilton H. Card (Ann. Mo. Bot. Gard. 18: 245-282,—1931) is a brief treatment on similar lines of a group usually regarded as a section of the genus *Swertia*. As here interpreted it comprises twelve species, seven of which are represented in California. A Monograph of *Cymopterus* including a Critical Study of Related Genera by Mildred E. Mathias (Studies in the Umbelliferae III, Ann. Mo. Bot. Gard. 17: 213-476,—1930) is a comprehensive account of twelve of the genera of a closely related group. California representatives include *Cymopterus*, *Phellopteris*, *Aulospermum*, *Pteryxia* and the endemic *Podistera*. Notes on the Distribution of Some Rocky Mountain Species by George J. Goodman (Ann. Mo. Bot. Gard. 18: 283-286,—1931) is a record of the occurrence in the Uintah Mountains, Utah, of several species not previously listed for that region.—E. K. CRUM.

Death Valley: The Facts, by W. A. Chalfant, is a careful account of a highly interesting region. It is, as the author insists, based upon facts rather than fancy, and should do much to dissipate current misconceptions. In addition to the chapter on plant life, those treating climatology, geography, geology, and the problems of desert travel will prove especially interesting to botanists. The book covers the subject thoroughly, adequately and interestingly. So comprehensive a manual for the desert is an achievement.

Through an ingenious investigation of the seed contents and the plant remains in adobe bricks which were taken from missions and other historic buildings of the early Southwest, Professor Geo. Hendry, College of Agriculture, University of California, has prepared a list of findings, and has also listed certain alien weeds, fifteen in number, believed to have been introduced into California in the mission period (1769-1824) and other alien weeds, sixteen in number, thought to belong to the post-mission period, 1824 and after. On account of having been found in the oldest walls, *Rumex crispus*, *Erodium cicutarium* and *Sonchus asper*, are regarded as of earlier introduction. ("The adobe brick as a historical source." Agricultural History, vol. 5, pp. 110-127.)

An important addition to our knowledge of the native pondweeds, by Dr. M. L. Fernald of the Gray Herbarium, appears under the title "The linear-leaved North American species of *Potamogeton*, section *Axillares*". The paper is accompanied by forty plates (Mem. Am. Acad. vol. 17, part 1, pp. 1-183. July, 1932).

ON PARENTHETICAL CITATION

J. C. NELSON

The only recognition of the parenthetical citation afforded by the International Code is found in Art. 43, which reads: "When, in a genus a name is applied to a group when it retains the same rank, or to a group which becomes of higher rank than before, the change is equivalent to the creation of a new group, and the author who has effected the change is the one to be quoted. The original author can be cited only in parentheses. Examples.—*Cheiranthus tristis* L. when moved into the genus *Matthiola* becomes *Matthiola tristis* R. Br., or *Matthiola tristis* (L.) R. Br.—*Medicago polymorpha* L. var. *orbicularis* L. when raised to the rank of a species becomes *Medicago orbicularis* All., or *Medicago orbicularis* (L.) All."

The use of the parenthetical citation, while not expressly enjoined, is thus implicitly recognized by the International Code. Even had the Code been entirely silent in the matter, the usage would be justified under Art. 5, which provides that "in the absence of rule, or wherever the consequences of rules are doubtful, established custom becomes law."

It is evident that in the first example cited above, to write *Matthiola tristis* L. would be to state what is not true, since Linnaeus did not establish the genus *Matthiola*, and very likely would not have recognized it; but to write *Matthiola tristis* R. Br. would convey the impression that Brown was the first to describe and publish the species. There seems no other course than to use the parenthetical citation, unwieldy as this may become. Gray (Structural Botany, ed. 6, 354, 1879) criticises this practice as "an endeavor to mix synonymy and nomenclature", and in the early editions of his Manual never used more than a single citation. He would have written *Matthiola tristis* R. Br., and allowed Linnaeus' connection with the name to appear only in works which set forth the complete synonymy. But it is manifestly inaccurate to give the impression by writing *Matthiola tristis* R. Br. that this species is on the same footing as *Barbarea vulgaris* R. Br., as if the one as well as the other was originally proposed by Brown.

Since by the citation of even a single author after the scientific name we to that extent "mix synonymy and nomenclature", and since a mere binomial unsupported by the name of any author may lead to serious confusion and misunderstanding as to the precise application of the name, the practice suggested by Art. 43 of the Code has been almost universally adopted, and may be considered to have acquired the legal force of established custom authorized in Art. 5. Reduced to more definite form, the rules of practice would be about as follows:

I. Names of higher rank.

Names of orders, families, tribes, subtribes, &c. do not require the name of the author.

II. Names of Genera.

a. In formal catalogues, manuals and floras, the name of a genus, when it occurs in its proper place in the family to which it belongs, and followed by an enumeration of the species which it includes, should be followed by the name of the author. Examples: *Cercis* L., *Crotonopsis* Michx., *Breweria* R. Br., *Sclerolepis* Cass.

b. Pre-Linnaean names taken up by Linnaeus or other authors in or after the year 1753 should be followed by the name of the original author in brackets. Examples: *Anethum* [Tourn.]. L. *Sherardia* [Dill.]. L. *Oldenlandia* [Plumier]. L. *Linaria* [Tourn.] Hill. *Taraxacum* [Haller] Ludwig.

c. Genera originally proposed as subgenera, and then raised to generic rank, should be followed by the name of the original author in parentheses. Examples: *Amphiachyris* (DC.) Nutt. *Succisa* (Rupp.) Neck. *Aplectrum* (Nutt.) Torr.

III. Names of Subgenera.

a. Rules II a and II b are equally applicable to names of subgenera, or to Latin plurals applied to the sections of a genus. Examples: *Euphacelia* Gray. *Eugerardia* Benth. *Oxyacanthae* Loud. (sec. of *Crataegus*).

b. Names originally published as generic, but which have been reduced to subgeneric rank, should be followed by the names of both authors. Examples: *Amygdalus* [Tourn.] L., when reduced to a section of *Prunus*, becomes *Amygdalus* (L.) Benth. & Hook. *Kneiffia* Spach, when made a section of *Oenothera*, becomes *Kneiffia* (Spach) Endl. *Biotia* DC. as a subgenera of *Aster* becomes *Biotia* (DC.) Torr. & Gray.

IV. Names of Species.

a. A single citation after the specific name indicates the original author, even though the description may have been corrected or amended by later writers. Examples: *Humulus Lupulus* L. *Aristolochia macrophylla* Lam. *Rumex venosus* Pursh. *Drosera Anglica* Huds. *Parnassia parviflora* DC.

b. Whenever a species has been transferred to another genus, the name of the original author is written in parentheses before the name of the author making the transfer; but no matter how many transfers have been made, the number of citations after any given binomial is not to exceed two. Example: *Hieracium runcinatus* James. 1823. when transferred to *Crepidium*, was written *Crepidium runcinatum* (James) Nutt. 1841. Its proper place appearing to be in *Crepis*, a second transfer was made, Nuttall's name being dropped, but that of James still retained, and we have *Crepis runcinata* (James) Torr. & Gray, 1843.

No matter how many times the species has been transferred, the name of the original author is a constant factor throughout all changes in synonymy. Since *Apargia boreale* was first published by Bongard in 1832, the name of Bongard must appear in each subsequent transfer, viz: *Leontodon boreale* (Bong.) DC. 1838. *Apargidium boreale* (Bong.) Torr. & Gray. 1843. *Microseris borealis* (Bong.) Sch. Bip. 1866. *Scorzonella borealis* (Bong.) Greene, 1887. Since *Scorzonella*

now appears to be too feebly separable from *Microseris*, the binomial goes back to the form *Microseris borealis* (Bong.) Sch. Bip.

c. When a variety has been raised to specific rank, and the original varietal name has been retained for the new species, as is generally the custom (though not obligatory—v. Art. 47 of the Code), the name of the original author of the variety is written in parentheses. Examples: *Dodecatheon integrifolium* Michx. var. *vulgare* Hook., when raised to a species, becomes *Dodecatheon vulgare* (Hook.) Piper. *Phlox caespitosa* Nutt. var. *condensata* Gray, when raised to specific rank, becomes *Phlox condensata* (Gray) E. Nels. But *Festuca ovina* L. var. *ingrata* Hack., since the varietal name was not retained for the species, becomes simply *Festuca idahoensis* Elmer, according to Art. 47 cited above.

V. Names of Varieties (and Subspecies).

a. When a variety of one species is transferred to another species without losing its rank as a variety, the name of the original author is retained in parentheses. Example: *Lysimachia stricta* Ait. var. *ovata* Rand & Redfield, when transferred to *L. terrestris*, becomes *Lysimachia terrestris* (L.) BSP. var. *ovata* (Rand & Redfield) Fernald. *Dodecatheon Hendersonii* Gray var. *leptophyllum* Suks. becomes *Dodecatheon conjugens* Greene var. *leptophyllum* (Suks.) Piper.

b. When a species is reduced to a variety, if the specific name is retained for the variety, the original author of the species is indicated in parentheses. Examples: *Mentha borealis* Michx., when reduced to a variety of *M. canadensis*, becomes *Mentha canadensis* L. var. *borealis* (Michx.) Piper. *Polygonum incanum* Schmidt becomes *Polygonum lapathifolium* L. var. *incanum* (Schmidt) Koch. But *Elymus mollis* Trin. becomes *Elymus arenarius* L. var. *villosus* E. Mey. under Art. 47 of the Code as above.

VI. Names of Sub-varieties and Formae.

The same rules as laid down in IV and V, are applicable to names of sub-varieties, *formae*, &c., wherever these are recognized.

Salem, Oregon, 1922.

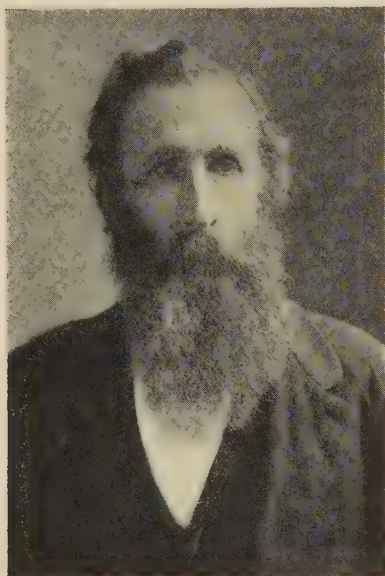
THE BOTANICAL EXPLORERS OF CALIFORNIA.—VIII

WILLIS LINN JEPSON

William G. W. Harford

Born at Rochester, New York on December 30, 1825 and educated in the public schools of his native town, William G. W. Harford came to California in 1853 and, as in the case of a number of California pioneers fell under the influence of Dr. Albert Kellogg and became a convert to natural science. From a very early day he was connected directly with the work of the California Academy of Sciences, an association which continued with one or two interruptions until his death. While Harford was primarily a conchologist, his interest in the native plants was strong and continually strengthened by his association with Dr. Kellogg. In 1868 and 1869 these two men distributed large and valuable sets of California and Oregon plants to various of the important herbaria.

The Academy records, due to the great earthquake of 1906, are imperfect, but we know that Mr. Harford was Curator of Conchology in the years 1867, 1868, 1874 and 1875 and that he was Director of the Museum from 1876 to 1886. During the early years of the Academy



W. G. W. HARFORD

everyone served without pay, but at a later time Harford received a small salary. At the time of the first political upheaval in the Academy, largely engineered by Mrs. Mary K. Curran, by which Professor George Davidson, Superintendent of the United States Coast and Geodetic Survey, was displaced as President by Dr. H. W. Harkness, Harford was one of those who lost his position. The next four years he spent as an assistant to J. J. Rivers, Curator of the Museum at the University of California. From a very early day he made his home in the city of Alameda and at his old time home, 1174 Regent street, he died on March 1, 1911.

Of Harford's collecting expeditions little is now known. He will be long remembered as the friend and protector of the gentle Kellogg, especially in Kellogg's later

years. Even more shy and unobtrusive than Kellogg, he was like him in simplicity of manner, in love of the beautiful, in his deeply religious nature. In 1886 Greene and Parry dedicated to him the genus *Harfordia*, endemic in Lower California, a genus which includes two species of plants of the *Eriogoneae* that had previously been referred to *Pterostegia*.

Thomas Bridges

In the southern Sierra Nevada one finds a handsome *Pentstemon* on rocky outcrops which was named *Pentstemon Bridgesii* by Asa Gray after Thomas Bridges who collected it in "gold days". Probably he was the first to collect it. A common and widely distributed species, it is a feature of the Yosemite region; it flourishes on the Kaweah River watershed; between Huntington Lake and Florence Lake, in seams of the rocky slopes running down to the South Fork San Joaquin River, it hangs its clusters of scarlet flowers over the glaring white granite ledges, the most brilliant flashes of color in evidence in August.

Bridges was an English collector, who made a collection of plants in California between 1856 and 1865. After Bridges' death what remained of his California collection was donated by his widow to the Smithsonian Institution and was distributed under the direction of the

United States National Herbarium. On account of the fact that his plants are frequently cited and that a few are the types of new species, it would be desirable to have a record of his collecting places in California. In the Transactions of the Botanical Society of Edinburgh (8:434-435,—1866) is a notice of his work in California and brief reference to his collections in the "Mariposa mountains" (meaning Mariposa County) and the "Coast Range". In the Proceedings of the Zoological Society of London are two papers which have to do with two communications made by Bridges to the society. One of these is a "List of Birds collected by Mr. Thomas Bridges . . . in the Valley of San Jose" (25: 125-126,—1857). The other is a paper by Bridges, "Notes on California Birds" (26:1-3,—1858), which shows that as a collector he had been in Yosemite Valley, the Santa Cruz Mountains, the Trinity Mountains, the Scott Mountains of Trinity County, Trinity Valley, and at Mt. Shasta.

This is apparently all that has been known save for his journey to Silver Mountain. One of the very early emigrant train routes over the Sierra Nevada surmounted the chain by a wagon trail along the East Fork Carson River to Ebhetts Pass, thence through Hermit Valley, descending to the Sacramento Valley on the west slope by way of the Calaveras Big Trees. A few miles off this emigrant trail on the east slope silver mines were discovered about 1860, resulting a little later in a characteristic mining excitement and the settlement of the mining town of Silver Mountain. Many travelers in early day California, as well as miners, took in Silver Mountain during the sixties. It was then one of the places to visit, so thither went Bridges in 1863. On the trail he was met by W. H. Brewer of the California Geological Survey, who records in his journal (Up and Down California, 432,—1930) his delight in meeting another botanist.

In the Sir William Hooker Correspondence at the Royal Botanic Gardens, Kew, England, there are preserved the letters written by Bridges to Sir William. One of these letters contains considerable information relating to Bridges' field movements in California and is therefore here presented in full. The footnotes to the letter in each case are inserted by the writer of this article.

San Francisco, May 5, 1858.

Sir W. J. Hooker
Royal Gardens,
Kew.

My Dear Sir William:

By the last mail enclosed in Mr. Cuming's letter I received your kind note written to him dated Feb. 26th. I now beg leave to answer your question—to know if it was my intention to remain in California. Permit me to say in reply that I am so delighted with the climate and interested in the Natural History of the country that I have neither intention nor desire to leave it and so long as I remain here I shall continue to collect specimens of Plants, Seeds, Birds, Quadrupeds and in fact any subjects of Natural History as time and opportunities will permit me to do so. I can scarcely describe to you how pleasing and

gratifying it has been to me to learn that in my collections you have found some new and rare plants—I was partially under the impression that from the labours of Douglas, Hartweg, Jeffrey, Lobb and other travelers from Europe with the many United States Exploring Expeditions that little or nothing remained to be discovered and only gleanings were left for those of the present day.—Although it is necessary to take into consideration that since the Gold discovery many new and extensive fields are open to the traveler where in former times no one could penetrate with safety from the Indians and other causes.—I am now firmly persuaded that on the summit of the Sierra Nevada there is a fine field for the Botanist in whatever degree of latitude he may direct his attention. This I know from experience as I found a great difference in the plants which I gathered last year in the Mariposa County from those which I collected on Scott's and Trinity Mountains near Yreka towards the borders of Oregon although they were situated about the same elevation viz. from 4-5000 ft. I figure to myself that you must have experienced pleasure when you saw the specimens of the *Darlingtonia Californica*, *Fremontia Californica*, *Lilium Umquaense*? and the singular *Sarcodes sanguinea*. The latter possesses a most extraordinary tuber which I found at the depth of 18 inches from the surface of the soil.—Unfortunately it will not keep so I have doubts if it will ever be cultivated. I found it common under the shade of those magnificent trees *Picea grandis*¹ and *P. amabilis*² near the summit of the Sierra Nevada in Mariposa County. The noble white Lily which I have numbered 270 and which I suppose is *Lilium Umquaense*³ is also a charming plant well worthy of a place with *L. lancifolium*—it has a most delightful perfume and it will be perfectly hardy, growing high up the slopes of the Sierra Nevada in the Pine forests. Seventy fine bulbs of this plant I lost with many others in that ill-fated steamer the Central America. This summer I hope to be able to replace them. *Cupressus Lawsoniana* must also have called your attention.—Whilst speaking of this fine tree allow me to ask if there is not great affinity in the cone with *Sequoia sempervirens* only on a minor scale—the bark of *Cupressus Lawsoniana* differs from every other California cypress—probably it may be a connecting link between *Sequoia* and *Cupressus*.

Now I am aware that you are in possession of my collections I hope you will preserve the nos. and I will shortly forward you a copy of the Catalogue which I made out when I divided the specimens⁴. In it you will find the locality of each plant and I now regret that I did not forward it when I sent the collections. It is similar to the lists of my Chilean Herbarium. Please let me know if you intend to publish the species which may prove new and also in what work.—In the Library of the N. H. Academy⁵ of California I find a copy of the Botany of Capt. Beechey's Voyage which has given me much information

¹*Abies concolor* Lindl. & Gord. ²*Abies magnifica* Murr. ³*Lilium Washingtonianum* Kell.

⁴This catalogue appears never to have been sent. ⁵Natural History Academy, that is California Academy of Sciences.

on the plants of this country and a friend here also possesses Hartweg's plants⁶. In the Library are also found many of the works of Dr. Torrey of the U. States.—Thus gradually I am becoming acquainted with the Flora of California.

A few days since I returned from a month's excursion in the mountains along the coast, Santa Clara County 50 miles south of San Francisco—During . . . I have made additions to my herbarium but birds and quadrupeds called most my attention.—By this mail I have forwarded to Mr. Cuming a very interesting collection. Nevertheless I never omit making specimens of Plants when I find any that I did not procure last season. I am in hopes that during the summer I shall be able to collect from two to three hundred species which I did not possess previously. The Oaks which are very numerous in variety in California have claimed my attention and I have now specimens of several species with the male flowers, although few species are celebrated for timber. They are deserving of a place in Parks and Arboretums on account of the beauty of their growth and foliage.

I should feel much pleasure in complying with any suggestions which you could give me relative to the Botany of this charming country and I should at all times take an interest in fulfilling your instructions. Hoping to have the pleasure of hearing from you.

I remain Sir William

Your Obedt Serv^t

Thomas Bridges

Address

Care of W. Lane Booker Esqr.

H. B. M. Consul

San Francisco—California⁷

Thomas Bridges was born at Lilly, Herts, England, on May 22, 1807. For about twenty years he traveled in South America as a collector-naturalist, especially in Bolivia, Peru and Chile. (See Hooker's *Journal of Botany* 1:177-178). In November, 1856, Bridges came to California and collected on the coast for about eight years. Soon after his arrival in San Francisco he lived in a house on Eleventh street between Market and Mission streets. The material used in this building had all of it been brought from China and the house was therefore called the Chinese House. Later he lived in Oakland. In April, 1865, he sailed for Nicaragua on a collecting expedition, and took passage on the return trip up the coast in the fall, but died at sea November 9, 1865. The captain of the ship, Captain Blethen, was a friend of Bridges and in consequence his body was brought home to California and buried in Lone Mountain Cemetery, San Francisco.

⁶Bentham's *Plantae Hartwegianae*.

⁷This letter (Hooker Correspondence, vol. 64, no. 17) was copied by the writer in 1905. Through the good offices of the late William Botting Hemsley, Keeper of the Herbarium, permission to print it was obtained from the then Director, Sir William Thiselton-Dyer. Since that time, I have visited the Royal Botanic Gardens in several different years and here desire to record my obligations for many courtesies to the Director, Sir Arthur Hill, and also to the Keeper of the Herbarium, Mr. A. D. Cotton, to the Deputy Keeper, Dr. T. A. Sprague, to the Librarian, Mr. A. S. Skan, and to others of the staff who have assisted me in many ways.

According to the testimony of his friend, Robert E. C. Stearns, at that time associated with him in the California Academy of Sciences, Bridges was extremely modest and unassuming in relation to his travels. He had further an unusually sensitive nature as evidenced by an experience on the Amazon River in South America. While in search of the Victoria regia, which he introduced into England, he saw a very rare monkey that the London Zoological Society was anxious to secure. He shot the female in a tree. She held a young one in her arms and hugged it to her as she fell. It was impossible for Bridges to erase this incident from his mind and he felt, he said, as if he had murdered a human being.

In January, 1847, he was married in Bristol, England.^a After his marriage he returned to Chile and in 1851 explored Robinson Crusoe's island of Juan Fernandez. While in Chile he suffered severely in a financial way from a flood that destroyed his botanical garden near Valparaiso, and shortly afterwards returned to England, stopping in Panama on the way. Coming to California in 1856, he ranged along the coast as far north as British Columbia but made San Francisco his home. One of the most interesting and distinctive of our ferns, *Pellaea Bridgesii*, which he discovered, was named for him by Sir William Hooker, as was *Silene Bridgesii* by Rohrbach. In addition the elegant *Brodiaea Bridgesii*, was dedicated to him by Sereno Watson, while Watson also first described *Lupinus formosus* var. *Bridgesii*. A California paper on his death said of him: "He was a noble-hearted Englishman, without guile or malice, and left a crowd of friends in California." A photograph of him was placed by Dr. Stearns in the archives of the Smithsonian Institution.

[See Britten, J., and Boulger, G. S., Bibliographical Index of British and Irish Botanists, 22 (1893). Hooker's London Journal of Botany, 4:571-577,—1845, a letter from Cochabamba, Bolivia, Apr. 3, 1845. Seeman's Journal of Botany, 4:64 (1866). Dall, W. H., Memorial Sketch of Thomas Bridges. F. L. S., F. Z. S. (Proc. Cal. Acad. 3:236-237,—1866). Loudon, Gardeners Magazine, 7:95: 16:116 (1840): it is here said that Bridges had other sources of income than the money derived from the sale of his plants. Merrill, E. D., Philippine Journal of Science, 30:163 (a reference to Bridges). Greene, H. A., in Jepson Correspondence, 24:241 (ms.). Stearns, R. E. C., in Jepson Field Book, 19:38-41 (ms.). Jepson, W. L., Notes on the Bridges letters in the Hooker Correspondence (Jepson Field Book, 15:8-21, ms.); the Hooker Correspondence contains eighteen letters of Bridges from Chile, mostly written at Valparaiso. A paper by Bridges, *Conifères de Californie*, I have never been able to see or trace to its place of publication.]

^aAccording to W. H. Dall (Proc. Cal. Acad. Sci. 3:236) he was married to Miss Mary Benson, a niece of Hugh Cuming; according to Britten and Boulger (Bibliog. Index Brit. & Irish Botanists, 22) to a daughter of Hugh Cuming. Hugh Cuming is celebrated as a natural history collector in the Philippines; he was also in Chile (cf. Merrill, E. D., Philippine Jour. Sci. vol. 30, no. 2).

TWO NEW SPECIES OF CEANOTHUS FROM CALIFORNIA

H. E. McMinn

Ceanothus serrulatus n. sp. Low prostrate evergreen shrub, thickly matting the ground; branches grayish or reddish, often rooting; leaves predominantly alternate, sometimes opposite near the ends of the younger branchlets, thin but firm, narrowly to broadly elliptical, rounded or obtuse at apex, tapering to rounded at base, $\frac{1}{2}$ to $\frac{3}{4}$ inch long, $\frac{1}{4}$ to $\frac{1}{2}$ inch wide, prominently veined beneath, with one main vein and often with 2 sublateral veins from the base, pale green and ultimately glabrous above, paler and densely microscopically flocculent-canescens beneath, especially on the veinlets, finely serrate except near the base; petioles about $\frac{1}{8}$ inch long; stipules small, early deciduous; stomata in sunken pits on the lower surfaces of the leaves; flower-clusters short racemose, cylindrical, or subglobose, $\frac{1}{2}$ to 1 inch long, terminating short leafy lateral branchlets; flowers white, rarely pale blue; fruit not known.

Type in the Dudley Herbarium, collected in a shallow draw between Emerald Bay and Cascade Lake, El Dorado County, California, H. E. McMinn 1734, May 30, 1926. Other collections: H. L. Mason 3316, May 30, 1926, from same locality.

This species is known only from the type locality where it occurs with *Ceanothus prostratus* Benth., *Ceanothus velutinus* Douglas, and *Ceanothus cordulatus* Kellogg. The prostrate habit and the presence of sunken stomatal pits on the underside of the leaves relate it to *C. prostratus* Benth., but the predominantly alternate, thinner and finely serrate leaves, the small early deciduous stipules, alternate branching, and short racemose clusters of white flowers easily separate it from that species. This is the only species of *Ceanothus* belonging to the *Euceanothus* section of the genus that has been found to have sunken stomatal pits on the under surfaces of the leaves. It may have arisen as a hybrid between *C. prostratus* Benth. and one of the other two alternate-leaved species found in the same locality.

Ceanothus Ferrisiae n. sp. Erect evergreen shrub, 3 to 6 feet high, with long stiff divergent branches and numerous short decussate lateral branchlets; leaves opposite, orbicular to broadly elliptical, abruptly tapering to rounded at base, $\frac{1}{2}$ to $1\frac{1}{4}$ inches long, $\frac{1}{4}$ to $\frac{3}{4}$ inch wide, with one vein from the base, dark green and glabrous above, paler and microscopically canescens beneath, regularly to irregularly short toothed or some leaves almost entire, the margins slightly revolute between the short teeth; petioles about $\frac{1}{8}$ inch long; stipules persistent, thick, and corky; stomata in sunken pits on the underside of the leaves; flowers white, in umbels $\frac{1}{2}$ to 1 inch long; capsules globose, $\frac{3}{16}$ to $\frac{5}{16}$ inch in diameter, with 3 dorsal or sub-dorsal horns, without intermediate crests.

Type in the Dudley Herbarium, collected above Coyote Creek, Madrone Springs road, Mt. Hamilton Range, Santa Clara County,

California, LeRoy Abrams 6626, August 13, 1917. Other collections: LeRoy Abrams 6627, 6628, from same locality. Roxana Ferris 832, May 17, 1918, from hillslope above first bridge on Cochran road $2\frac{1}{2}$ miles east of Madrone station, Santa Clara County. H. E. Mc-Minn 1873, December 21, 1928, and 1887a—z, January, 1929, from same location as Ferris 832, and 2649, August 29, 1931, from hillslope about $\frac{1}{2}$ mile southeast of the above location. All collections seen have been made from the Coyote River region east of Madrone station in the Mt. Hamilton Range. A few plants of *C. cuneatus* Nuttall were found associated with one colony of this new species, but apparently they do not occur commonly together.

This species is related to *C. cuneatus* Nuttall but differs from the typical form of that species in its larger, more elliptical, and variously toothed leaves. The regularly and finely toothed leaves of some specimens resemble the leaves of *C. rigidus* var. *grandifolius* Torrey, but the flowers are white instead of blue as in that variety. In the Santa Cruz Mountains there is a form of *C. cuneatus* Nuttall with large leaves which is closely related to this species, but all the leaves are entire in contrast to the toothed leaves of *C. Ferrisiae*.

In 1928 a set of 60 transplants was collected and set out in the trial garden at Mills College. An examination of the plants in January, 1933, showed the same characteristic variation in leaf margins as exhibited by plants in their native habitat.

In the Contributions from the Dudley Herbarium of Stanford University, vol. I, number 4, 1930, I referred to this plant as a variation of *C. cuneatus* Nuttall.

Department of Botany,
Mills College.

DUPLICATE CARVINGS IN TREES

RICHARD M. HOLMAN

Land surveyors are familiar with the use of trees as monuments to mark a corner of a survey, or, what is more common, as "bearing" or "witness" trees which serve to aid in determining the position of a corner in case the monument which originally marked the corner has been destroyed or removed. A tree which is to serve such purpose is first blazed so as to expose a flat surface of young wood just beneath the cambium and in the wood thus exposed there are carved the characters which identify this particular tree. In time these carvings and the whole area from which the bark was removed become completely covered with new bark which grows inward from the margins of the wound. The cambium layer within this new bark gives rise, during the succeeding years, to new layers of wood which cover the original inscriptions, so that in time the characters cut by the surveyor may be buried deep within the trunk of the tree. After many

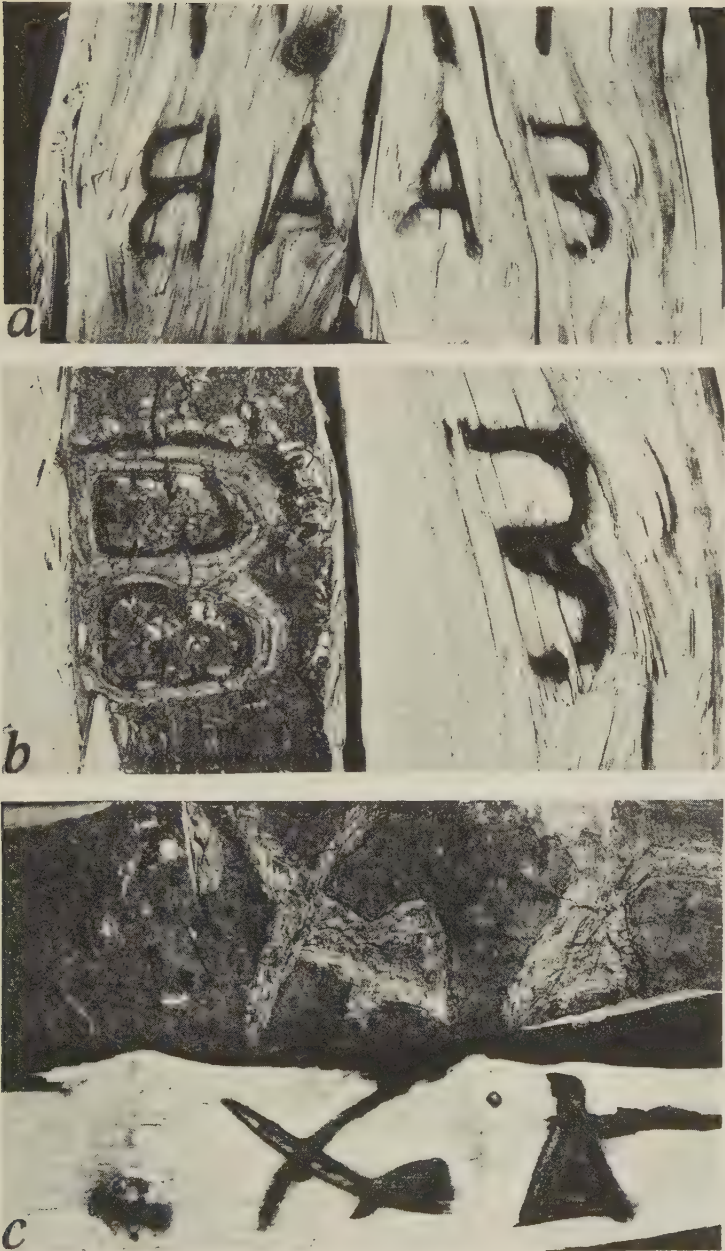


Fig. 1. Sections of the wood and bark of *Umbellularia Californica* showing the preserved carvings and inscriptions.

years the bark of such a tree may still show the form of the blaze, but the inscription can only be revealed by cutting away the overlying layers of bark and wood.

Of still greater interest than such trees with their inscriptions hidden within the trunk are those in which carvings still visible on the surface of the bark are duplicated deep in the wood. These are found mostly in trees which have thin, smooth bark, relatively free from ridges and having little tendency to scale off at the surface. In such trees characters cut directly into the bark, but penetrating through the cambium into the young wood, are "split," after the wounds have been healed over, by the new cambium into two portions, one in the bark and the other in the wood.

In Fig. 1a are shown the buried inscriptions (the letters A and B) revealed when a short length of the trunk of a California laurel was being chopped into firewood, and Fig. 1b shows the inscription upon the bark which corresponds to the buried letter B in the wood. The wood section itself shows the twenty-eight annual rings of wood and the bark which have been formed since the carvings were made. The young wood exposed when the carvings were made soon died and became discolored. Subsequently this wood was completely covered with bark including a new layer of cambium. Following this complete closure of the wound, the new cambium produced the annual layers of wood (which buried the inscription within the tree) and the new bark.

In Fig. 1c are shown similar duplicate carvings of peace pipes and tomahawks cut in a branch of the same tree by some youth 23 years before the tree was felled. These carvings in the bark have been somewhat distorted from their original form, which is shown in the wood, as the result of the growth in circumference of the branch, which was of relatively small diameter at the time the carvings were made.

It is not only carvings or other injuries made by man which are thus preserved in duplicate in the wood and bark of trees. Many thin, smooth barked trees show similar records of injuries due to sap-suckers, and wounds due to lightning sometimes leave their record both in the bark and buried within the wood of the tree.

University of California,
Berkeley, California.

THE ANNUAL DINNER FOR 1933

The California Botanical Society met for the annual dinner at the International House, 2299 Piedmont Avenue, Berkeley, on Saturday evening, February 25, at 6:00 p. m. Dr. George J. Peirce, the president, acted as toastmaster. He first called upon Dr. W. L. Jepson, whom he happily styled "Father of the California Botanical Society." Dr. Jepson discussed briefly the effect of the record low temperatures of last December upon certain native and introduced species. Mr. J. T. Howell, next called upon, gave a resumé of the impressions received from the Galapagos Islands and way points, by the botanist of the

recent Templeton Crocker Expedition. Dr. H. L. Mason in the capacity of "Keeper of the Plant Morgue" spoke briefly of his interest in the future of the University of California Herbarium.

The lecture of the evening was given by Dr. D. T. MacDougal of the Carnegie Institution of Washington, the subject being "Features of Growth in Monterey Pine." Dr. MacDougal demonstrated the dendrograph, by means of which he has been enabled to keep accurate record of the activity of the cambium of this tree over a period of years. The Monterey pine, he pointed out, lives a hand-to-mouth existence, storing starch for a very limited time only. The cambium sheath has no periodicity, does not become fatigued, and continues its activity whenever temperature conditions are favorable. Activity ceases at 8 degrees Centigrade. Having seen the evidence, his hearers are likely to remember that each of the more than three million needles of an average tree of this species produces during the three years of its active life the equivalent of the wood contained in three toothpicks. The efficiency of the cambium of this pine allows a rapid, almost phenomenal growth whenever conditions are favorable. The speaker's stimulating subject and informal manner invited discussion, and there were several anecdotes of the prowess of this California conifer. In New Zealand where there are extensive plantations, a mature crop of timber may be harvested three times during the century.

Eighty-two members and guests attended the dinner which was planned by Dr. and Mrs. H. L. Mason.—E. K. CRUM.

PLANT ALIENS AT QUINCY

DAVID D. KECK

Man, in his migrations over the earth, has carried his civilization with him. He delights in the possession of familiar objects whose presence serves as a reminder of that civilization he has relinquished in order to pluck an existence from untried and virgin soils. By his very nature, the pioneer must possess a fortitude, stoicism and disregard for the personal comforts of life which are qualities most of us lack. Yet, in the heart of every man there lingers at least some trace of sentiment which, in the pioneer, causes him to carry strange objects into the wilderness. This is often accomplished with great difficulty and the cherished belongings may be peculiarly ill-fitted to their new surroundings.

Everyone recalls those bright flowers that surrounded his childhood home and enjoys the sentiment bound up with them. So it is not strange that garden flowers have been among the prominent objects to migrate with first settlers to new frontiers, regardless of the fact that the flora of the new region may far surpass that which was left behind. Other cultivated plants of even more importance to the pioneer are those useful as food for man and beast. These have been very freely carried about the globe. In addition, certain plants of traditional, but perhaps more or less fanciful medicinal value are

frequently introduced to new localities by colonists. The tansy, *Tanacetum vulgare*, of the following list may owe its wide distribution to an ancient belief that its seeds were effective agents in ridding the intestinal tract of parasites. Of course, too, there are the inevitable weeds which follow rapidly in the footsteps of civilization and mark the disturbances in the native vegetation.

The writer, in company with Dr. and Mrs. Jens Clausen of the Carnegie Institution of Washington, spent over three days early in July, 1932, at Quincy. This little town is the county seat of Plumas County and is located in American Valley on the west flank of the northern Sierra Nevada at 3500 feet elevation. Quincy lies at the edge of the very extensive meadow of American Valley through which flows Spanish Creek, a tributary of the Feather River. Our first survey of the flora at Quincy impressed us with the exceptionally large number of European or cosmopolitan plants growing there. Dr. Clausen, comparing the scene with his native Denmark, commented that he could easily suppose he were in a northern European meadow in which there were a few California weeds. Consultation with Jepson's Manual showed us that many of these species were specifically indicated to occur at Quincy.

Inquiries addressed to a few residents of Quincy disclosed the fact that American Valley had been largely settled by Swiss and German families. One resident, Mr. Schneider, told us that his mother had brought a hanging basket of *Lysimachia nummularia* across the plains from Kansas in a covered wagon. This member of the Primulaceae is particularly adapted for use in hanging baskets because of its beautiful trailing stems closely beset with large yellow bowl-shaped flowers. It was our informant's impression that this hanging basket *Lysimachia* was the ancestor of the very numerous colonies of this species that now spot the meadow of American Valley and which, we were told, have spread to some extent, at least, into the surrounding woods.

The origin of the first human colonists seems to offer ample explanation of the fact that, of the plants we collected, those which are not native to the region are all common species in Middle Europe. We did not detect any plant immigrants from the eastern United States or from the Mediterranean region. Incidentally, we paid very little attention to the Monocotyledons and probably there are at least some Mediterranean grasses at Quincy.

Possibly the following four species have not been previously catalogued as members of the California flora:

LYSIMACHIA NUMMULARIA L. is very thoroughly established, as stated above. There is a sheet at the University of California Herbarium collected by Mrs. Norman D. Kelley "near Quincy" in 1914. No other material seen from California.

TANACETUM VULGARE L. (*Chrysanthemum tanacetum* Karsch) is also well established at Quincy and, in addition to the author's collection, was collected there in 1912 by H. M. Hall, who observed it was "common in waste places all through American Valley." Appar-

ently this species has become naturalized also in Humboldt County along the road between Fortuna and Fernbridge (Kildale 2250, Dudley Herbarium). Seemingly very rarely naturalized in western North America.

CHRYSANTHEMUM PARTHENIUM (L.) Bernh. is sparingly established north of Spanish Creek, near Quincy, well away from human habitations. Additional locations were found in the University of California Herbarium: Diablo Canyon, San Luis Obispo County; north side of Mt. Shasta; Alta Loma Ranch, Howell Mountain, Napa County. It is often quite impossible to judge from herbarium labels whether such plants, frequently cultivated, have really become naturalized at a given locality.

MYOSOTIS VERSICOLOR (Pers.) Smith has become established in the meadow of American Valley but only one colony of this species was observed. This *Myosotis* is apparently quite thoroughly naturalized in northern Oregon west of the Cascades as well as in the eastern United States and it should be expected in California. It has been collected at Eureka (Tracy 827, University of California Herbarium, fide Bracelin).

RANUNCULUS REPENS L. we found well established in the meadow at Quincy and are not aware that it has been previously reported from the Sierra Nevada.

We also collected the following well-established European introductions at Quincy:

<i>Dactylis glomerata</i> L.	<i>Myosotis scorpioides</i> L.
<i>Polygonum persicaria</i> L.	<i>Nepeta cataria</i> L.
<i>Polygonum convolvulus</i> L.	<i>Taraxacum vulgare</i> L.
<i>Sisymbrium altissimum</i> L.	<i>Chrysanthemum leucanthemum</i> L.
<i>Sisymbrium sophia</i> L.	<i>Anthemis cotula</i> L.
<i>Lepidium perfoliatum</i> L.	<i>Centaurea cyanus</i> L.
<i>Trifolium pratense</i> L.	<i>Cirsium arvense</i> Scop.
<i>Trifolium hybridum</i> L.	<i>Cirsium lanceolatum</i> (L.) Scop.
<i>Trifolium repens</i> L.	(observed only).

The writer is indebted to Mrs. H. P. Bracelin for looking up distributions in the Herbarium of the University of California.

Carnegie Institution of Washington,
Division of Plant Biology,
Stanford University, California.

NOTES AND NEWS

Reprints have been received of "A Study of the Genus *Podaxis*" by Elizabeth Eaton Morse. This interesting and previously little known fungus has been the subject of an extended study carried on at the University of California. The most ample collections were obtained from the Colorado Desert. Twelve excellent plates accompany the text. (*Mycologia* 25:1-33, pls. 1-12.—1933).

¹ Hall 9385, not collected by us.

The first of the series of local meetings planned by the California Botanical Society was held in Davis and Sacramento April 1-2, 1933. The party met at Davis at 12:30 p. m. April 1, and in the afternoon viewed some of the projects in applied botany now being carried on at the University of California farm. This was followed by a session at the Horticultural Building of the University of California at Davis where papers relating to the agricultural and horticultural aspects of botanical science were presented. At 6:30 p. m. the party met at the Gold Rush Restaurant at Sacramento. Dinner was followed by a lecture, "The Nutritive Value of Native Plants in Relation to the Live-stock Industry", by Prof. G. H. Hart of the College of Agriculture. Fifty-seven members and guests were present at the banquet. On the following morning under the tutelage of Mr. Ashley Braun the State Capitol Grounds were visited and proved especially interesting botanically. The Society has reason to be gratified with the success of this first attempt to enlist in its activities students and lovers of plants in other parts of the state. Thanks are due to Dr. W. L. Howard, Dr. G. H. Hart, Mr. Ashley Braun, Dr. H. A. Borthwick, Dr. H. F. Copeland and others who successfully executed plans for the Sacramento-Davis meeting.

On April 12, 1933, the California Botanical Society makes note of the twentieth anniversary of its founding. The first meeting was held in the Oakland Public Museum at 4:00 p. m. on April 12, 1913. With Dr. W. F. Bade in the chair a temporary organization was effected. On April 26 of the same year the Society was regularly organized with Dr. W. L. Jepson as first president. This twentieth anniversary year finds the names of 15 charter members on its membership roll: Dr. W. F. Bade, Mrs. Viola Baird, Mr. F. F. Barbour, Mr. Anson S. Blake, Mrs. Anson S. Blake, Mr. W. W. Carruth, Mrs. Edwin R. Dimond, Prof. W. T. Horne, Dr. W. L. Jepson, Mr. Duncan McDuffie, Miss Amy Rinehart, Dr. W. A. Setchell, Mr. J. B. Smith, Mrs. I. R. Smith, Miss Olive Thacher. During the year 1932 the Society lost two charter members by death: Dr. Harvey M. Hall and Miss Anna Head. For the support of these and all other loyal members the Society is deeply appreciative.

The first report of the Rancho Santa Ana Botanical Garden at Anaheim, issued in 1931, contains a brief history of the founding by Mrs. Susannah Bixby Bryant, a list of the garden plantings with the horticultural practice by B. D. Stark, the nurseryman, and a list of plants indigenous to the ranch by Dr. C. B. Wolf, curator of the herbarium. The Garden site contains about 200 acres. The headquarters building is now completed and houses the herbarium and library.

Dr. F. H. Billings contributes a paper on "Microsporogenesis in *Phoradendron*" to the *Annals of Botany* for October, 1932. These careful studies were based on material of California species. The author is Professor of Botany in the University of Redlands.

DAVID DOUGLAS IN CALIFORNIA

WILLIS LINN JEPSON

David Douglas, the botanical explorer for the London Horticultural Society, arrived in California at Monterey on December 22, 1830, by sea from the Columbia River where he had been since October 11, the date of his arrival from England on his second journey in that region. Douglas remained in California until August, 1832, when he sailed for the Hawaiian Islands, thence taking a schooner to Fort Vancouver on the Columbia River in October.¹ He was the first botanical collector in California in residence for any extended period and during this time he traveled through the Coast Ranges from Monterey north to the Mission San Francisco de Solano (Sonoma) and south to the Mission of Santa Barbara. He was not only the first traveler to collect the extensively rich and varied spring flora of the Coast Ranges, nearly all the species of which were new to botanical science, but also the first to leave some written description of it. Hundreds of new species, our most familiar plants, were based on the Douglas collections, study of which is not exhausted even at this day. It would be a very great advantage in view of the taxonomic interest of the Douglas plants if the localities of collection were known. No information is, however, available for these specimens save the designation "California". Douglas, it is true, kept a field journal and numbered his specimens. The numbers are attached to the specimens in the Kew Herbarium, for example, but his journal was lost at the time of the shipwreck in the Fraser River,—a most disastrous loss. While most of his field work was plainly done in the Coast Range valleys, yet on account of the fact that he collected certain plants it would seem an inevitable inference that he penetrated eastward as far as the inner Coast Range. For example he collected *Thelypodium flavescens* Hook., which develops abundant colonies in the inner range but has never been found near Monterey. At Kew one of the collections of *Thelypodium flavescens* made by Douglas carries on the sheet a waif of another species, an extremely tiny plant of *Streptanthus hispidus* Gray, which, it is not likely, would have been gathered anywhere but in the inner South Coast Range country where it is a restricted endemic. It has been suggested that Douglas visited Mt. Diablo, but the form of *Calochortus pulchellus* which he obtained might have been collected in the Sonoma region. In a few rare cases the indication "Monterey" or "San Francisco" appears with an original description, but in no case on the original label.

At the most, little is definitely known of the detailed movements of Douglas in California. His stay here was, however, so productive and so important botanically that every item of information is interesting. For this reason there is here reproduced a transcript of an unpublished letter written by Douglas to William Edward Hartnell

¹ Bancroft, H. H., History of California, vol. 3, p. 403.
MADROÑO, vol. 2, pp. 97-104, July 1, 1933.

at Monterey. The original, preserved in the Bancroft Library (Vallejo Documents, vol. 31, p. 49), is in places not readily decipherable but nevertheless gives an excellent idea of the roster of Douglas' friends in California.

To/ William Edward Hartnell Esq.
Monterey

Noviembre 11, 1833

Fav. of
A. B. Thompson

At my tent on the Hill
of Yerba Buena²
Novm 11, 1833.

My dear Sir:

Do inform D^{na} Teresa that she has at this moment a very humble servant in Saint Francisco who exceedingly regrets not having the pleasure of laying before her, in person, his kindest regards. He requests her to believe that the multitude of kindnesses she bestowed on him when under her roof, the recollection of which is not destroyed by the distance of time and place over which he has passed since he left Monterey, on the contrary, this remembrance of which is to him gratifying.

I have heard of the death of poor John Noriega of so much promise—Such is the wish of Providence and ought to tend to admonish us to submit with cheerfulness to His dispensations. That which is dearest to us is often that which is soonest taken away from us, and it is well it should so be.

I felicitate D^{na} Angustias³ on the *changing* of her name. May the number of her days be equalled only by the abundance of comfort spiritual and temporal she may enjoy through life and that all may conduce to her happiness. Salute her spouse in my name and tell him I give him joy. When you see or write to St. Barbara fail not to present my Comp. to Dⁿ Jose Noriega and his amiable wife.—Also to friend Robinson.

I can hardly express how pleased I should have been even only with a few hours conversation with you. I do not despair of that

²"The Hill of Yerba Buena" was probably Telegraph Hill, then known as Loma Alta, which name was sometimes applied to the Cove of Yerba Buena. Douglas arrived in the "Dryad", the "Columbia Vessel" of the text, which came in for water, supplies, and to refit. Chief Factor Finlayson was on board. Apparently while in port Douglas set up a tent ashore for his observations and collection activities. The landing was at Clark's Point, about Broadway and Battery Streets, and presumably his tent was not far distant.

There was no settlement at Yerba Buena at this time. William Heath Davis in "Sixty Years in California" (pp. 10-11) gives a description of it in 1833.

The letter was sent by the hand of A. B. Thompson, then supercargo of the "Loriot", for many years a resident of Santa Barbara.—ANSON S. BLAKE.

³Doña Angustias was the daughter of Don Jose Noriega, and "friend Robinson" was the man she married, Alfred Robinson, author of *Life in California* and for many years agent of the Pacific Mail Steamship Company in San Francisco. It is the account of this wedding that is given in Dana's *Two Years Before the Mast* as occurring in Santa Barbara.—ANSON S. BLAKE.

gratification at no distant period—though not God willing before I see the “Land o’ Cakes”.

The Columbia vessel bound for the Sandwich Islands dropped in here a few days since for water and fresh provisions which after a tempestuous passage of 21 days has landed here nearly a wreck. The Governor of the Columbia, Mr. Finlayson, is on board. I was anxious to visit Monterey that you might have had this gentleman’s acquaintance. he will be there in Oct. 1834 and will have a letter or letters for you.

As to *self* I have little to tell you of—at least little that would in any wise interest you—for it is difficult to separate *self* and to be agreeable. I have been in the Snowy Mountains as high as the 60° over a dreary inhospitable country, where I suffered extreme hardship—from hunger, indeed nearly utter starvation. Intense cold in the mountains then scorching weathering heat—and to compleat my misfortunes I lost the *whole* of my collection at a dreadful cataract of a river⁴ nearly as large as the Columbia in the mountains. The only articles saved were my *Instruments and astronomical Journal* not even a morsel of food of any kind, bedding etc. When I tell you that I was an hour and 40 minutes in the water in the rapids myself and after escaping had 300 miles over a barbarous country without food or shelter you will form an idea of my condition, I am thankful to God that no lives were lost though some from exhaustion suffered greatly while others could not endure the privation of the want of food.

It is probable I may make a short stay at Oyhee⁵ for the purpose of examining the vulcano & Botanizing, surveying, &c. If you have time to spare to inform me on the following points you will confer on me a mark of your respect. 1st Your own health—family— 2nd Increase of family. Names of *the* or little strangers—Condition of farm. State of vineyard &c.

Address to the care of the British Consul.

If you ever should see or write to any of my old friends, the Fathers I entreat you to mention me to them—particularly Padre Narcisso⁶ and Padre Pedro Cabot. —In the meantime as you will certainly see the Rev. P. Short⁷ I ask you to give him my respects. I have been only once at the Mission where I had the pleasure of meeting Gen. Figueroa⁸. I am glad to have seen this gentleman for he appears much disposed to cherish industry, to stand by the virtuous and to do justly. I am also glad to hear him express himself so kindly towards you and the old gent. at Sta. Barbara.

Give my best complements to Dna Concepcion Arguello⁹—Captain

⁴Frazer River, British Columbia.

⁵Old spelling for Hawaii.

⁶Narcisso Duran.

⁷Patrick Short, an Irishman and an exile from Honolulu; cf. H. H. Bancroft, *History of California*, vol. 5, p. 719.

⁸Governor Figueroa, the name mis-spelled by Douglas.

⁹Heroine of California’s most famous romance; cf. Sir George Simpson, *An Overland Journey Round the World During the Years 1841 and 1842*. American edition, part 1, p. 206 (1847). See also Bret Harte’s Poem, *Doña Concepcion de Arguello*.

Zamorano, Dña Luisa, Mr. Spence—Captain Cooper—and on no account to forget Dn. Estevan Monras and all to whom I have the distinguished honor of being known to.

I pray you accept of my best wishes for your health happiness and prosperity, and believe me unalterably

Your attached servant
and friend

D. Douglas

NOTES ON THE INTRODUCED FLORA OF CALIFORNIA

IRA L. WIGGINS

Two plants not previously known from the state have been collected recently in San Diego County by Mr. L. W. Nuttall and Mr. W. V. Shear, County Agricultural Inspector, respectively. The presence of a species of *Vicia* not included in western botanical literature came to my attention in the summer of 1930 while teaching at the Humboldt State Teachers College at Arcata, and Mr. Nuttall's collection of *Lepidium draba* L. extends the previously known range of that species in California. This note is offered in order to establish a definite record of the occurrence of these species in the localities listed here.

KYLLINGA BREVIFOLIA Rottb. was collected in San Diego, on May 28, and again on July 21, 1932 by Mr. Nuttall. He sent the specimens to me for identification since the species was not listed in the literature available to him. In sending the second collection, after the smaller collection of the earlier date had been identified, he enclosed the following note: "*Kyllinga brevifolia* grows on the east side of a house on Arch Street. There is a small steep bank between the house and the pavement and a narrow strip of grass between pavement and curb; the plant is found in both places. The grass has been, and is now cut very short, but the little plants —2 inches high—bravely bloom. The sod is very dense, but apparently they are determined to conquer and finally take possession."

The genus *Kyllinga* contains about two hundred species, most of them confined to tropical regions, but two species in addition to the one listed above also occur in the southeastern part of the United States.

This sedge is a perennial plant with solitary oblong-ovoid spikes 5-8 mm. long subtended by three involucre bracts, two of them spreading, the third erect and giving the spike the appearance of being lateral instead of terminal. The keels of the spikelets are serrulate-ciliate. The leaves are narrowly linear and grass-like, usually a little shorter than the scape. The plant spreads by horizontal rhizomes, and exceedingly numerous fibrous roots form a dense sod just below the surface of the soil.

VICIA VILLOSA Roth. is a well established escape in numerous localities from the Santa Cruz Peninsula northward into Washington. It is so abundant in the vicinity of Humboldt Bay that it competes

successfully with the native and introduced grasses on open hillsides and inner sand dunes. Specimens collected as early as 1900 are in the Dudley Herbarium, and for the most part the original labels bear the name *Vicia cracca* L. These specimens differ markedly from *Vicia cracca* in having spreading instead of closely appressed hairs on stems, peduncles and leaves, longer, narrower and more pubescent calyxlobes, and slightly larger flowers than the latter, and in being annual or biennial instead of perennial.



Fig. 1. *Centaurea Iberica* Trevir. A, upper leaf. B, Achene with paleaceous pappus bristles. C, basal leaf. D, flowering head. A, D $\times 1$; B $\times 5$; C $\times 1/6$.

There are sheets of *Vicia villosa* in the Dudley Herbarium from Santa Cruz, Santa Clara, Mendocino, and Humboldt counties, California; Deschutes, Douglas, Hood River, and Wasco counties, Oregon; King and Whitman counties, Washington; Blaine and Latah counties, Idaho; and one sheet each from Montana and Indiana. We have no specimens of *Vicia cracca* from the coastal region of California.

Mrs. Roxana S. Ferris detected this species in the *Vicia cracca* cover several years ago and segregated the specimens belonging to the two species.

CENTAUREA IBERICA Trevir. was collected near Ramona, San Diego County, by Mr. Shear, and sent to us for identification. He realized at the time that the plant was similar to *Centaurea calcitrapa* L. but saw that it differed from that species in size and general appearance. *Centaurea Iberica* is a native of Spain, and, together with a variety, is reported from a number of Mediterranean localities, Armenia, and the region between the Caspian Sea and the Black Sea in southwestern Russia.

Although this species is somewhat similar to *Centaurea calcitrapa*, it is improbable that the two species are confused in any herbaria of the country for they are distinctly separated by several obvious

characters. The upper leaves of *Centaurea Iberica* are elliptic to oblong, 10-18 mm. long, and entire, while those of *Centaurea calcitrapa* are pinnately divided into linear or lanceolate lobes about 5 mm. wide, or sometimes undivided but linear and less than 5 mm. wide, and always serrulate. Only the lower leaves of the former species are serrulate. The heads of *Centaurea Iberica* are broader, the spines heavier, the achenes slightly longer than those of the commoner species and are white to sordid instead of brown. *Centaurea calcitrapa* achenes are destitute of any pappus, while those of *Centaurea Iberica* have a pappus of 40-50 narrow, finely serrulate paleaceous bristles arranged in about three series. The accompanying figures indicate the distinctive characters of this thistle.

LEPIDIUM DRABA L. was collected several months ago by Mr. Nuttall "—along the Tia Juana River a little way north of the border," where it had become well established. This weed had been reported from Los Angeles, Huntington Beach, and Chino, in southern California, and is not uncommon from the vicinity of San Luis Obispo northward, but this is the first record, so far as I am aware, for San Diego County.

Dudley Herbarium,
Stanford University.

IN MEMORIAM

Dr. Alice Scouvert, a former member of this Society, died in Brussels, Belgium, on November 17, 1932. While in California she took a lively interest in the native plants. On the Society's field excursions, unconsciously on her part, she put to shame many members who insisted on using vernacular names by indicating to them how quickly she obtained a clue to the relationship of plants strange to her when favored with the Latin binomial. Her training at the University of Brussels was in botany and the allied sciences.

Mrs. D. O. (Clara Adele) Hunt of St. Helena, a former member, died on April 4, 1932. For forty years she studied the natural history of the native plants of Napa Valley and cultivated many in her garden. For nearly as long a period her botanical activity found expression in arranging exhibitions and meetings in order to interest the people of her valley in the flowering vegetation. She was a relative of Alphonse Wood, whose "Class Book of Botany" was a familiar text in the eastern United States two generations ago.

Dr. Harvey Monroe Hall, a charter member of the Society, died March 11, 1932. He had long been connected with the University of California, and in later years with the Carnegie Institution of Washington. He was an able botanist who had done a notable amount of work, and his sudden passing was a shock to his friends.

Miss Anna Head, also a charter member, well-known in California as a pioneer in education for girls, died December 24, 1932. She was the founder of the Anna Head School in Berkeley and its principal from 1880 to 1909, and during that time did much to stimulate the

interest of students in botany and gardening. Since her retirement in 1909, she had been living in Berkeley.

At the annual dinner of the Society on February 25, 1933, the president, Dr. George J. Peirce, after speaking words of memorial for each of these members, asked the membership to rise and remain standing in silence for a few moments in tribute to their memory.—W. L. J.

NOTES AND NEWS

At the Atlantic City meeting of the American Association for the Advancement of Science, December 28-30, 1932, Section G (Botanical Sciences) held a memorial program celebrating the centenary of the birth of Julius von Sachs (1832-1897). On this occasion, a paper by Dr. D. H. Campbell, of Stanford University, on the Sachs text-book and its influence on botany in America, was read by Dr. G. J. Peirce of Stanford.

At the Ann Arbor meeting of the National Academy of Sciences, in November, 1932, Dr. D. H. Campbell of Stanford University read a paper on "Some problems of the Hawaiian flora."

Wilhelm N. Suksdorf, pioneer field botanist of the Pacific Northwest, was struck and killed by a train near his home in Bingen, Washington, on October 3, 1932. Probably most Pacific Coast botanists who have been engaged in field studies within the state of Washington within the last fifty-five years, have had occasion to make the acquaintance of this most affable, enthusiastic and able German botanist. It became more essential in recent years for students of that flora to seek out Mr. Suksdorf for information regarding exact distribution and other matters pertaining to numerous species bearing Mr. Suksdorf's name or named by him. One could always expect most courteous responses to queries, and Mr. Suksdorf gave freely of his time to accompany botanists to the more obscure localities in his neighborhood. At the time of his death, Mr. Suksdorf was doubtless the senior field botanist of the Pacific Coast, being the last survivor of that list of botanical collectors cited in the Botany of California. According to a note in the journal Science, Mr. Suksdorf's herbarium and library have been willed to the State College of Washington.—D. D. KECK.

"Plants of the Rocky Mountain National Park" by Ruth E. Ashton is a publication of the National Park Service designed for the use of tourists. It contains 157 pages with 115 illustrations which are almost wholly photographic.

In the American Journal of Botany for October, 1931, Edna L. Johnson in a paper "On the alleged stimulating action of X-rays upon plants" reports that in the case of tomato, sunberry, sunflower and vetch seedlings no increased growth of the experimental plants over the controls was evidenced by measurements of height and green and dry weight determinations.

The California Botanical Society met December 15, 1932, at 8:00 p. m. in Room 2093, Life Sciences Building, University of California, Berkeley. Dr. George J. Peirce, the president, occupied the chair. The business meeting was followed by a lecture on the Templeton Crocker Expedition to the Galapagos Islands by Mr. J. T. Howell of the California Academy of Sciences, botanist of the expedition. Mr. Howell gave an account of his impressions and experiences in this fascinating region. The slides which accompanied the lecture assisted the audience materially in forming an accurate idea of the topography, the major plant formations, and some of the more conspicuous of the species native to the islands. Mr. Howell's remarks upon the endemic cacti were especially instructive. After the lecture Dr. H. L. Mason led an open discussion upon endemism. Dr. Mason pointed out that a consideration of distribution in time as well as in space is important to an understanding of present ranges. He emphasized the relation of the area now occupied by a given species to that of the flora of which it is a part and to the distribution and migrations of this flora during past geological eras. This viewpoint called forth spirited comment, leading parts being taken by Dr. L. R. Abrams, Dr. A. W. Herre, Dr. David Keck, Mr. J. T. Howell and Dr. David Goddard.—E. K. CRUM.

A meeting of the Society was held on January 12, 1933, in Room 2093, Life Sciences Building, University of California, Berkeley. Dr. George J. Peirce, the president, occupied the chair. At the business meeting the present staff of officers was reelected: President, Dr. George J. Peirce; first vice-president, Mr. H. E. McMinn; second vice-president, Dr. H. L. Mason; treasurer, Dr. David D. Keck; secretary, Miss E. Crum. The speaker of the evening, Mr. C. J. Kraebel of the California Experiment Station, U. S. Forest Service, discussed "Erosion Control in Forestry." Mr. Kraebel gave an account of the various methods of control and of the plant species utilized in this work. The slides illustrated areas menaced by destructive erosion, and the effectiveness of the means adopted for control.—E. K. CRUM.

The native bulbs and plants grown by Carl Purdy in his garden at "The Terraces" are listed in his two catalogues for 1933. One of these contains three well-executed colored plates of California lilies, erythroniums and calochorti. These catalogues may be had by addressing him at Ukiah.

The California Academy of Sciences received a number of guests in the new Simson African Hall on April 4, 1933 at 8:15 p. m. in honor of the eightieth anniversary of its founding. The unfinished groups of African wild life were on exhibition in the niches which they will permanently occupy. Dr. C. E. Grunsky, President and Director of the Academy, gave a resumé of the history, endowments and present needs of the institution. Mr. William H. Crocker, President of the Board of Trustees, welcomed the guests and spoke briefly of his interest in the Academy. A social hour followed during which the new East Wing was open for inspection. Refreshments were served by the staff.—MRS. H. P. BRACELIN.

A NEW SERICOCARPUS FROM OREGON

L. F. HENDERSON

SERICOCARPUS SIPEI Henderson, sp. nov. Planta attenuata, alta, foliis ovatis, acutis, scabris, 2-3 polycaribus; capitulis racemoso-cymosis, numquam corymbosis. Pappus primo albus, tardius fuscus, floris longitudine; achenia tenuora (macra), oblanceolata vel obovata. Ceteris *S. oregonensi* congruit.

Perennial from a short crown-like rootstock; stem nearly upright, tapering all the way, 90-120 cm. high, glabrous to slightly puberulent; leaves alternate, soft and thin, nearly entire, glandular beneath, somewhat scabrous, especially the margins, ovate-oblong, acute, sessile, on lower one-half of stem 7-9 cm. long, gradually smaller above; heads in a nearly columnar-compound cyme, though in the smaller plants this is a simple or racemose cyme; each head columnar in early anthesis, becoming later campanulate, slightly scabrous to glabrous, 10 mm. long; bracts of the involucre oblong-lanceolate, in many series, with green appressed or recurving tips, white-coriaceous below; receptacle alveolate, flat or nearly so; flowers all rayless; pappus at first white, becoming later dun-colored, slightly flattened and enlarged at apex, closely ciliate, equaling the corolla; corolla yellow of varying degrees, otherwise just as in *S. oregonensis*, narrowly funnel-form, lobes narrowly lanceolate; stigmas narrowly oblong-lanceolate; achenes appressed silky, obovate-cuneate, to oblanceolate cuneate, flattened, transverse section narrowly elliptic, 3 mm. long by 1 mm. wide.

This plant is certainly near *Sericocarpus oregonensis* Nuttall, but has, to the writer, good specific characters. Nuttall, in his "Description of New Species and Genera of Plants in the natural Order of the Compositae", 1840, p. 302, describes *S. oregonensis* as follows: "Leaves lanceolate-oblong, entire and, as well as the involucre, glandular beneath, above scabrous; stem smooth, corymb compound, inner scales of the involucre acute; rays longer than the pappus . . . Stem attenuated. Pappus distinctly scabrous, the inner row obviously clavellate . . . The discal florets are exerted beyond the pappus. Stigmas filiform, acute, nearly smooth, glandular . . . the pappus is unusually long and silky-white."

Our plant differs radically in size and shape of leaves as well as their texture, in shape of cyme ("corymb" of Nuttall), in length and color of pappus, in color of flower (light yellow), in uniform absence of rays, and in wider, flatter achenes.

This plant was discovered by Professor Frank P. Sipe of the Botanical Department of the University of Oregon, about 10 miles from Eugene, Oregon, on rather stony hillsides, in open woods of *Pseudotsuga*, *Arbutus* and *Castanopsis*. Thus it is quite localized. At a later date Professor Sipe and the writer found it again in several localities, always in small areas. I have taken pleasure in naming this unique plant for its discoverer, an indefatigable collector and ecologist. The type is my No. 15,708.

University of Oregon, Eugene, September, 1933.

A NOTE ON THE GENUS *LYSICHITUM*

MARY L. BOWERMAN

Our Pacific Coast skunk cabbage has been known for many years as *Lysichitum camtschatcense*. This species was first described from Asia. Linnaeus, in the first edition of his *Species Plantarum*¹, named it *Dracontium camtschatcense*. He recorded it only from Siberia although it was first recognized by him as *Dracontium foliis lanceolatis* in the dissertation *Plantae Rariores Camtschatcenses*². In 1857 Schott transferred it to a new monotypic genus, *Lysichitum*.

Recently Hultén and St. John have studied the Asiatic and Californian plants and have found that the two are specifically distinct. Since all synonyms refer to the Asiatic plant, they have described the Pacific Coast form as a new species, *Lysichitum americanum*³.

The true *Lysichitum camtschatcense* is characterized as follows: a white, instead of a pale lemon-yellow, spathe; odorless flowers; a smaller spadix on the average; smaller perianth segments, 2-3 mm. in length as compared with 3-4 mm., with their upper part fleshy rather than distinctly membranous; the stamens more protruded, and the anthers considerably smaller, 0.6-0.8 mm. as compared with 0.9-2 mm.

The above-mentioned paper was called to my attention by Mr. W. T. Stearn, of Cambridge, England. In conversation he said that he had studied these two forms and, independently, had come to the conclusion that they are specifically distinct. In the *Gardeners' Chronicle*⁴ he reviews the article by Hultén and St. John and adds some further points of interest. In material examined by him, he notes that the perianth segments of the American species are more inclined outward than those of the Asiatic species so that each flower is more conical, and the whole spadix is warty by comparison with the more even spadix of the latter. This difference can be observed in the photographs published by Hultén and St. John.

Other differences have been noted by J. W. Besant, Keeper of the Glasnevin Botanic Garden, Dublin. Speaking of the Asiatic form, as known in British gardens, he says⁵, "this white-spathed plant might be a distinct species as not only are the spathes broader in proportion to their length, but the leaves differ from those of the yellow-spathed plant, which has enormous, deep green leaves, whereas in the white-flowered variety they are shorter, blunter and almost glaucous green, especially when young". He further notes that the seeds of the white-spathed plants are slow to germinate which is in striking contrast to

¹1753, p. 968.

²1750, p. 29.

³Eric Hultén and Harold St. John, *The American Species of Lysichitum*, *Svensk Botanisk Tidskrift*, Band 25, Häfte 4, pp. 453-464 (1931).

⁴Vol. 91, pp. 477-478 (June 25, 1932).

⁵Quoted by Stearn (l. c.) from *The Gardeners' Chronicle*, vol. 85, p. 441 (June 15, 1929).

the behavior of the yellow one. The latter is reported by Stearn as germinating self-sown around the parent clumps at Kew and at Glasnevin. Even when growing under the same conditions, *Lysichitum camtschaticense* begins to grow and flower a month later than *Lysichitum americanum*.

The odor of the plants is a matter of interest. Hultén describes the Kamchatka plant as odorless (from memory, according to Stearn). The white-spathed plant at Kew likewise has no scent. Upon comparing fresh material from Glasnevin and from Captain Simpson-Hayward's garden, Stearn found both yellow and white equally redolent, "the odour of the white plant being sweeter and more pleasant than the skunk-like reek of the yellow". This is surprising if, as believed, the Glasnevin plant is a clone from the Kew plant.

Our skunk cabbage grows in swampy woods or in cut-over woodlands, and the same can be said of the Asiatic species. In Kamchatka it usually occurs in *Alnus hirsuta* swamps; only occasionally was it observed, by Hultén, in a cut-over *Betula* forest.

Lysichitum camtschaticense is found from the Kamchatka peninsula southwards along the Kurile islands and Sachalin to the Hokkaido (Yezo) and Japan proper (Honschu), and on the Asiatic mainland in Primorskaya, near the mouth of the Amur river. *Lysichitum americanum* occurs in Alaska, British Columbia, Washington, Idaho, Oregon, Montana and California.

The observations of these several authors clearly indicate that the Asiatic and American species have been confused through similarity of habit and through difficulty of preservation. Both morphological and physiological characteristics afford evidence of the distinctness of these plants. The facts of geographic distribution are also in accord; one species, *Lysichitum camtschaticense*, is strictly Asiatic, the other, *Lysichitum americanum*, is limited to the Pacific Coast of North America.

University of California, Berkeley, Sept. 21, 1933.

PINUS FLEXILIS IN THE UPPER KERN RIVER WATERSHED

RIMO BACIGALUPI

While on the annual summer "High Trip" with the Sierra Club, the writer came upon a somewhat extensive colony of *Pinus flexilis* along the lower reaches of Whitney Creek about one and a half miles below Lower Crabtree Meadow. So far as ascertainable, this species has not heretofore been authentically reported from the western slope of the Sierra Nevada. G. B. Sudworth, in his "Forest Trees of the Pacific Slope", reports it as occurring "along south side of South Fork of Kings River, at 10,500 to 12,000 feet." In the summer of 1928 and again during that of 1932, the writer attempted to verify this record of its occurrence on the Kings River watershed. The regions visited, all within or about the altitudinal range cited by Sud-

worth, are as follows: eastern slopes of Avalanche Peak, north and east slopes of Sphinx Crest, headwaters of Sphinx Creek, portions of the watershed of East Creek, base of East Vidette, slopes about Center Basin and Foresters' Pass. *Pinus Balfouriana*, *Pinus monticola* and *Pinus albicaulis* were frequently encountered, while search for *Pinus flexilis* met with no success. It is not unlikely that Sudworth obtained his data from a forest ranger who might easily have mistaken either *Pinus monticola* or *Pinus albicaulis* for *Pinus flexilis*.

The colony of *Pinus flexilis* seen on Whitney Creek is composed of young, slender, healthy individuals perhaps twenty-five to thirty feet tall. Associated species of *Pinus*, of about the same vigor and height, are *Pinus Balfouriana* and *Pinus monticola*. This young and vigorous forest grows on the shady south slope of Whitney Creek, at an elevation of 9800 feet, just below the point where the canyon becomes steep and narrow as it begins to cut its way through the wall of the Kern River Canyon. Below this point, *Pinus flexilis* occurs at intervals on both sides of the gorge, but here it is a gnarled and stunted tree. The last trees were seen, associated with *Pinus ponderosa* var. *Jeffreyi*, at the mouth of Whitney Canyon, at an elevation of about 8000 feet, hardly 100 feet up on the wall of the Kern River Canyon.

Mature cones, as well as branch-tips with young cones still attached, were collected. The specimens are deposited in the Dudley Herbarium of Stanford University (Bacigalupi, no. 2225).

Dudley Herbarium, Stanford University,
January 20, 1933.

THE MONTEREY CYPRESS GROVE OF POINT LOBOS

Of all relict plant endemics along the Californian coast, *Cupressus macrocarpa* is one of the most interesting and significant in relation to the geological history of the Californian shore line. As is well known it occurs in only two small clusters on the ocean headlands at either side of the Carmel River mouth. It is with a sense of humiliation for California that the botanist observed the cutting up of the Point Cypress grove into building lots. On the other hand it is regarded as doubly fortunate that the remaining Point Lobos grove, still in its natural state, has been purchased in part by the State Park Commission for the state system of parks in California.

This important objective has, however, not been fully realized and the state has called upon the Point Lobos Association to raise an additional sum of nearly fifty thousand dollars. The President of the Association is Mrs. Caroline Phelps Stokes Hunter, the Treasurer is Mr. William H. Crocker. Any sum, however small, may be sent to the Secretary of the Point Lobos Association, 114 Sansome Street, San Francisco and will be acknowledged.—W. L. JEPSON.

OPEN LETTERS

Yampah and Filaree

I find on page 220¹ of my copy of J. C. Fremont's Narrative of "Explorations and Adventures in Kansas, Nebraska, Oregon and California" the following reference to *Anethum graveolens*: "At this place I became first acquainted with the yampah (*Anethum graveolens*), which I found our Snake woman engaged in digging in the low timbered bottom of the creek. Among the Indians in the Rocky Mountains, and more particularly among the Shoshone or Snake Indians, in whose territory it is very abundant, this is considered the best among the roots used for food." *Anethum graveolens* is described as locally naturalized from Europe in Southern California according to Jepson's Manual. Is it not possible that it could have been distributed from the region where Fremont saw it rather than from Europe?

In the same book I find on page 414² a reference to *Erodium cicutarium* on the American River where Fremont says he found Indian women gathering the leaves of that plant in baskets. They told him they cooked and ate the leaves. Can you give me any date at which this plant was introduced from the Mediterranean region? Did the agent which introduced the plant into the hills of California show the Indians how to use it or did they discover this for themselves after the plant became so widespread and common?—MRS. W. EGBERT SCHENK, Carmen del Cerrito, Mohave Desert, October 20, 1931.

Although Capt. John C. Fremont was a first rate observer of and took a marked interest in the native plants, he was in reality not a critical botanist, and he often called the new things he met in the west by the names of such similar things as he knew in the gardens at home. *Anethum graveolens* of Linnaeus, or dill, is a European plant long cultivated in the eastern United States. Fremont's "*Anethum graveolens*" is *Carum Gairdneri*, a plant indigenous in a vast area stretching from South Dakota and British Columbia to Colorado and southern California.

As to the second query: it has been generally supposed that the filaree (*Erodium cicutarium*) and the bur clover (*Medicago hispida*), both distinctly Mediterranean species, were unconsciously introduced into California by the Spanish missionaries, since they brought with them household goods, seeds for planting crops and above all hands of sheep, the great disseminators of certain kinds of seed. No one in California made any record of such things as weeds in those days. The period of introduction of the conspicuous European black mustard (*Brassica nigra*) is likewise very uncertain, although legends say that the Spanish missionaries brought it. In any event there are no definite scientific records of this mustard until rather recent decades. Even

¹ J. C. Fremont, A report of the exploring expedition to Oregon and North California in the years 1843-44. Official edition, p. 124.

² J. C. Fremont, l.c., p. 243.

the botanists of the California Geological Survey (1861-1870) are largely silent on these matters of alien weeds. Of course it is possible, though not so probable, that the filaree was introduced by some Spanish voyager at an earlier date than the Mission settlements. A decisive conclusion doubtless, is not now possible. As to the use of the filaree by the native tribes, these tribesmen knew better the plants that grew about them, from the standpoint of their tribal needs in food, medicine, implements, fibre and folk rituals, than any white man has ever known them. It is certain that the Indian would have no difficulty in making use of filaree on his own initiative. It is not likely that any white man could ever instruct a tribesman regarding the economic native plants from the standpoint of the tribesman's daily necessities. In his own special field the Indian was an expert.—W. L. JEPSON.

Artificial Vegetative Propagation of Redwood

My method for vegetative propagation of redwood (*Sequoia sempervirens*) is as follows. Cut away all suckers not well covered by soil. On the remaining suckers cut a wide notch about three-fourths through at the point of contact with parent root or bole. Pack with damp soil and stake. If the notch is too narrow it will heal over and not produce roots. Keep well watered and in a year's time there will be roots. But it is well to wait two or three years before the final cut from the parent bole. Then select suckers having the individual root system well started. Dig a hole wide and deep enough not to injure the terminals of the sucker's roots and with a saw cut away your plant. Wrap roots in wet burlap or some substitute at once. Suckers from one to two and one-half feet high are preferable. Plant them in good soil liberally mixed with humus. I recommend that they be planted in five gallon cans with holes punctured in bottom. It is advisable to keep them in a protected spot in partial shade and continuously damp. In this way they can be kept in cans until they are six or eight feet high. When planting in permanent place remove cans by cutting away with shears and keep well watered until firmly established. Use stakes with the crooked or leaning plants.—H. A. GREENE, Monterey, California.

NOTES AND NEWS

The California Botanical Society held a meeting on March 16, 1933 at 8:00 p. m. in Room 460, Physiology Building, Stanford University, Palo Alto. Dr. George J. Peirce, the president, occupied the chair. The first speaker, Mr. S. B. Show, Regional Forester of the United States Forest Service, discussed "Problems in Forestry as Applied Botany". Mr. Show pointed out some of the complexities of the problem confronting the manager of the state's most extensive farming operations. He must protect his millions of acres from attacks of insects and fungi, from overgrazing, fire and erosion. He must consider the conflicting interests of various groups of forest-

users. Especially in harvesting the timber crop for commercial use care must be taken to preserve the aesthetic value of the forest for vacationists and nature lovers. This discussion was followed by a lecture on "The Greatest Forest in the World" by Ynes Mexia. In the course of her botanical collecting Mrs. Mexia navigated the Amazon by steamer, canoe and raft. Her graphic account of the great rain-forest of South America, which is only to be traversed by water ways, was illustrated by excellent views taken en route. Sixty-one members and guests attended the meeting, the first to be held at Stanford.—E. K. CRUM.

The Western Society of Naturalists held its Fifth Winter Meeting at the Hopkins Marine Station, Pacific Grove, California, December 20-22, 1932. A feature of particular interest to botanists as well as zoologists was the "Symposium on Methods in Taxonomy" that occupied the first two sessions of the meeting. Seven members of the California Botanical Society were among the fourteen speakers. The topics in this symposium in most cases were presented both from the botanical and zoological points of view. Topics and speakers included: 1. Introduction: fundamentals, aims, and methods.—LeRoy Abrams and E. B. Babcock. 2. Comparative morphology as the basis of taxonomy: value and limitations.—C. C. Epling and G. F. Ferris. 3. Geographical distribution as an aid in taxonomy.—J. T. Howell and A. H. Miller. 4. Paleontological problems and methods in taxonomy.—H. L. Mason and L. H. Miller. 5. Cytology as an aid in taxonomy.—C. D. Darlington. 6. Genetics as an aid in taxonomy.—Jens Clausen and F. B. Sumner. 7. Experimental taxonomy: stability and modifiability of plant forms.—David D. Keck. 8. The problem of racial differentiation and its bearing on taxonomy.—Th. Dobzhansky. 9. Plant relationships suggested by the morphology and apparent atopic similarity of pollens from the Order Chenopodiales.—H. E. McMinn.—D. D. KECK.

John Wynne Gillespie, one of the professional botanists of the Pacific Coast, a young man of great promise, died September 13, 1932. He received the Ph. D. degree from Stanford University in 1930 for a dissertation entitled "The Sympetalae of Fiji." Dr. Gillespie had traveled to the Fiji Islands as a Fellow of the Bishop Museum and published several critical papers on that flora. He spent a year at the Gray Herbarium of Harvard University as a National Research Fellow, studying historical material from the Fiji flora, and during the summer of 1932 pursued these studies further at the Kew Herbarium. Shortly before his death, Dr. Gillespie had been appointed Professor of Botany at the Arizona State Teachers College at Tempe. He was well known in California where he had done considerable field work in collaboration with his wife, Doris Kildale Gillespie. Mrs. Gillespie, a collector of plants from little known portions of northwestern California, and a contributor to this journal, has taken over the teaching position at Tempe.—D. D. KECK.

Professor LeRoy Abrams, curator of the Dudley Herbarium of Stanford University, sailed from San Francisco for Italy, via the Panama Canal, early in March, 1933. He plans to study in various European botanical centers until September. Dr. Abrams chose to visit southern Europe first and travel northward with the spring, thus permitting a perspection of the European flora at the most favorable season. On Dr. Abrams' itinerary are several of the largest European herbaria at which he proposes to study types and other critical specimens from the Pacific Coast to facilitate the preparation of the remaining volumes of his "Illustrated Flora of the Pacific States."—D. D. KECK.

Dr. Ira L. Wiggins, of the Dudley Herbarium of Stanford University, left in the latter part of February, 1933, for Tucson, Arizona, to join Dr. Forrest Shreve, of the Desert Laboratory, Carnegie Institution of Washington, on a trip of botanical exploration into north-western Mexico. This is the third of a series of cooperative trips arranged between the staffs of the Desert Laboratory and the Dudley Herbarium to make phytogeographic studies in this region, most interesting botanically. Dr. Wiggins is on his second trip to this area with Dr. Shreve, Dr. L. R. Abrams having represented the Dudley Herbarium on the first excursion.—D. D. KECK.

The Sixth International Congress of Genetics, held at Cornell University in August, 1932, gave opportunity for two prominent European botanists to visit California botanical institutions. Dr. Ö. Winge, cyto-geneticist from the Royal Veterinary and Agricultural College, Copenhagen, and Dr. C. D. Darlington, cytologist from John Innes Horticultural Institution, London, visited this state during the fall. Dr. Winge accompanied Dr. J. Clausen and Mr. W. M. Heusi, of the Carnegie Institution of Washington, on a seed-collecting trip into the mountains of northern California. Dr. Darlington has established a winter residence at the California Institute of Technology, where he is continuing his cytological studies.—D. D. KECK.

Dr. W. W. Robbins, head of the Division of Botany at the Davis Branch of the College of Agriculture of the University of California, is spending six months in Europe where he is continuing his investigations on sugar beets, weeds and seeds.

All Californians will welcome the addition of valuable lands to the western boundary of Yosemite National Park. The latest such addition comprises approximately 8,785 acres along the scenic Wawona Highway and will bring that road entirely within the limits of the park for the first time. Previously, the road ran for some distance between the Mariposa Grove and Yosemite Valley outside of the park boundaries. President Hoover signed a proclamation on August 13, 1932, authorizing the addition. It is particularly significant to botanists as a measure that will afford protection to additional highly scenic pine forests.—D. D. KECK.

ERIOPHYLLUM AND MONOLOPIA

LINCOLN CONSTANCE

In undertaking a critical study of the genus *Eriophyllum*, one of the first problems encountered is that of finding characters to distinguish this group clearly from the closely related genus *Monolopia*. Most of the species of the two genera are not apt to be confused, but the smaller forms, lacking the characteristic tooth on the ligules, belonging to Gray's (1) section *Pseudobahia* of *Monolopia*—which Rydberg (5) raised to generic status—and *Eriophyllum ambiguum* Gray, show a remarkable intergrading of characters, which makes them extremely difficult to place with confidence. The members of *Pseudobahia* have been treated differently by successive taxonomists, and they and *Eriophyllum ambiguum* have been transposed from one genus to the other until the synonymy has become quite confusing.

The questionable species and the characters most frequently used in differentiating them are as follows:

1. *MONOLOPIA MINOR* De Candolle, Prodr. 6: 74. 1837. *Eriophyllum minus* (DC.) Rydberg, N. Am. Fl. 34: 86. 1915.

Leaves mostly pinnately 3-5 parted, the divisions linear; involucre bracts distinct to the base or somewhat united, in 2 series; receptacle naked, sharply conical; disk-corollas glabrous; achenes of both ray- and disk-florets distinctly flattened, glabrous; epappose. An obscure plant, collected somewhere in California by Douglas, and not reported since.

2. *MONOLOPIA BAHIAEFOLIA* Bentham, Plantae Hartwegianae. 317. 1849. *Eriophyllum bahiaefolium* (Benth.) Greene, Fl. Franc. 446. 1897. *Pseudobahia bahiaefolia* (Benth.) Rydberg, N. Am. Fl. 34: 83. 1915.

Leaves entire or somewhat 3-lobed; involucre bracts distinct to the base or somewhat united, in 1 series; receptacle naked; sharply conical; disk-corollas glabrous, except for a ring of villous hairs at the junction of the tube and throat; achenes of both ray- and disk-florets distinctly flattened, hairy; epappose. This is apparently also a rare plant, from the Sierra Nevada foothills, and adjacent plains, and few specimens are to be found in the herbaria studied.

3. *MONOLOPIA HEERMANNII* Durand, Jour. Acad. Nat. Sci. Phila. 2 ser. 3: 93. 1855. *Monolopia bahiaefolia* Benth. var. *pinnatifida*, Gray, Botany of the Geol. Surv. of Cal. 1: 383. 1876. *Eriophyllum Heermannii* (Dur.) Greene, Fl. Franc. 444. 1897. *Pseudobahia Heermannii* (Dur.) Rydberg, N. Am. Fl. 34: 83. 1915.

Leaves pinnately parted, the lobes again lobed or divided; involucre bracts distinct to the base or somewhat united, in 1 series; receptacle naked, sharply conical; disk-corollas glabrous, except for a ring of villous hairs at the junction of the tube and throat; achenes of both ray- and disk-florets distinctly flattened, pubescent; epappose. This is also from the Sierra Nevada foothills, and is apparently more common than the last, since it is well represented in the herbaria. It may very

possibly be a variety of the last, as Gray (1) regarded it, differing from it only in the greater division of the leaves, and agreeing with it in the peculiar localized hairiness of the corollas.

4. *ERIOPHYLLUM AMBIGUUM*, Gray, Proc. Am. Acad. 19: 26. 1883
Bahia Wallacei Gray, Proc. Bost. Soc. Nat. Hist. 7: 145. 1859.
Lasthenia (Monolopia) ambigua Gray, Proc. Am. Acad. 6: 547. 1865.
Bahia ambigua Gray, Botany of the Geol. Surv. of Cal. 1:382. 1876.
Bahia parviflora Hall, in herbarium. 1907. *Eriophyllum paleaceum*
 Brandege, Bot. Gaz. 27:450. 1899. *Eriophyllum Parishii* Hall, in
 herbarium. 1907.

Leaves entire or few-toothed; involuclral bracts distinct to the base or somewhat united, in 1 series; receptacle naked or paleaceous at the summit, sharply conical; disk-corollas glandular-hispid on the tube; achenes of both ray- and disk-florets quadrangular, at least the disk achenes not at all flattened, hirsute to glabrous; pappus of about 8 paleae or wanting. This is an exceedingly variable species of the desert region of Southern California; from the extremes of its variation several species have been described.

From this brief resumé of characters, it may be seen that the pubescence of corollas and achenes, and the degree of union of the involuclral bracts are not constant. In the opinion of the writer, the two genera should be separated on the basis of the conformation of the achenes, correlated with the constant absence of the pappus in some of the above, and its variable appearance in the last. The first three agree with the other species of *Monolopia* in having distinctly flattened achenes, and in being uniformly epappose. The last has the quadrangular achenes of *Eriophyllum*, and the occasional absence of pappus does not separate it from the genus, since this may occur in other species of *Eriophyllum*.

Gray (1) set forth these ideas a number of years ago, but they have not been heeded by subsequent systematists, else much needless confusion might have been avoided. He (1) placed the first three in *Monolopia*, the third as a variety of the second, and finally settled upon *Eriophyllum* for the last, where it has remained ever since. Greene (2) transposed *Monolopia bahiaefolia* and *M. Heermannii* to *Eriophyllum*, placing them close to *E. ambiguum*, but left *Monolopia minor* in the other genus. Hall (3) retains "*Eriophyllum Heermannii*" and does not discuss *Monolopia minor* nor *M. bahiaefolia*. *M. bahiaefolia* and the very closely related *M. Heermannii* are separated by Jepson (4), who retains the former in *Monolopia* and the latter in *Eriophyllum*. Rydberg sets up the genus *Pseudobahia* to include *M. bahiaefolia* and *M. Heermannii*, but inconsistently designates *M. minor* as "*Eriophyllum minus*". The treatment afforded these species by Gray seems, in the opinion of the writer, to be most clearly in line with their natural affinities.

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University of California, Berkeley, June, 1933.

THE BOTANICAL EXPLORERS OF CALIFORNIA—IX.

WILLIS LINN JEPSON

Charles Frederick Sonne

The birth place of Charles F. Sonne is said to have been on the island of Bon, a possession of Denmark. The date of his birth was July 2, 1845. When a young man he emigrated to the United States and worked in a grocery store in Boston, soon thereafter going to Denver. From this place in the early days he drove across the deserts a herd of cattle to Virginia City in Nevada. In 1876 he removed to Truckee where he was employed as a bookkeeper by the Truckee Lumber Company. It was more especially during the period of this employment that he collected with much zeal the native plants of the region of the Truckee River watershed and made large numbers of dried specimens. He numbered his specimens carefully and faithfully recorded on the labels the validating facts of locality, date and habitat. His specimens were well prepared and the mounted sheets are remarkable for their clear and handsome lettering and general neatness.

Out of the results of his long-continued field work in this region grew a list of the plants which he had collected in Placer, Nevada and Sierra counties in California and Washoe County in Nevada, especially between the years 1878 and 1892. This manuscript is done in his usual methodical and scholarly manner. It reflects, doubtless, the thoroughness of the college education which he had received in Denmark in his youth.

Dedicating to him the Boraginaceous genus *Sonnea*, E. L. Greene in 1889 said that he "gives promise of becoming as intelligent a botanist as he has been a diligent collector and field observer in that region



of country to which these plants belong" (cf. *Pittonia* 1:22). *Lomatium Sonnei* was also named for him by Coulter and Rose and *Cicuta Sonnei* by Greene.

About 1900 he went to San Francisco to live and there died May 11, 1913. His body was taken to Truckee for burial and now lies amongst the mountains where he botanized for so many years.

Nancy Jane Davis

In the northern Sierra Nevada one of the more unusual and peculiar shrubs is *Leucothoe Davisiae*. This name was published by Asa Gray in the Proceedings of the American Academy of Arts and Sciences, volume 7, page 400, in 1867. It was based on a manuscript name by John Torrey and the specific description rested on material collected near Eureka in Nevada County by Miss N. J. Davis, the discoverer. During this entire period since 1867, it does not appear to have been known in California whether Miss Davis were a local botanist or a chance traveler. At any rate this was a collector concerning whom the writer never had the faintest clue.

One evening in August, 1926, a small group of botanists, engaged in cheerful talk, were seated on a garden lawn above Lake Cayuga in the state of New York. One of them, Professor J. H. Faull, then of the Toronto University, very incidentally and very casually to other matters, spoke the name Nancy Davis. The writer of this article had never before heard the name, but some impulse caused him to make one query after another and it soon developed that Nancy Davis of Birmingham, Pennsylvania, and Miss N. J. Davis, the discoverer of the rare shrub, *Leucothoe Davisiae* of California, were one and the same. Through the interest of Dr. and Mrs. J. H. Faull were obtained the printed memorials of Miss Davis from which are derived the following facts as to her life.

Nancy Jane Davis was born in the Kishacoquillas Valley near Lewiston, Pennsylvania, on December 20, 1833. She died at Birmingham, Pennsylvania, on June 18, 1921. At that place she had been in 1853 one of the founders of the Birmingham School and for over sixty years its principal. On the sixtieth anniversary of the school, Mount Holyoke College, of which she was an early graduate, honored her with the degree of Doctor of Humane Letters. In 1863 she came to California by way of Panama and made in the district of Nevada County, says Dr. Gray, "a fine and beautifully prepared collection of plants". She visited California again in 1893 and yet again in 1915.

The name of Miss Davis is enshrined in many a memorial at or hard by Birmingham School. It is pleasant to make more definitely known the name of another plant lover, noble in mind and generous in purpose, who belongs to the roster of Californian field botanists. Her plants, it is to be said, went mainly to Asa Gray, and towards Cambridge she bent her steps for several summers in order to carry on botanical work. Amongst other things she also collected a sub-alpine *Polygonum* in northern California which was named for her as *Polygonum Davisiae* by W. H. Brewer in 1872 (*Proc. Am. Acad.* 8:399).

[In Memorium. Nancy Jane Davis, A. M., L. H. D. Three Portraits. Birmingham School. 1921. Davis Memorial Fund and Alumnae Notes. 1925.]

John Boardman Trask

On February 8, 1849, a company of argonauts under the leadership of John Woodhouse Audubon, son of the great ornithologist, Audubon, left New York City for New Orleans. The party traversed the plains, mountains and deserts from Texas by way of northern Mexico to San Diego where it arrived on November 4, 1849, proceeding thence to the placer diggings in the Sierra Nevada. One of the members of this company was John B. Trask.

The gold rush brought many remarkable men to California but few in that early day more outstanding as a scientist than Trask. His interests were very wide and the soundness of his training in fundamental subjects while an undergraduate at Yale College enabled him to achieve notice or distinction in several lines. He was a physician and surgeon, a chemist, a mineralogist, a seismologist, a geologist, a paleontologist and to no small extent a botanist. The first medical journal in California was founded and edited by John B. Trask, M. D., and David Wooster, M. D. Dr. Trask's connection with it continued through the years 1858 and 1859. As the first State Geologist of California, two of his reports on the geology of California may be found in Assembly Document no. 9 (1854) and in Senate Document no. 14 (1855). These and other reports contain much matter on the soils of various regions of California, as well as some references to the spontaneous vegetation.

Dr. Trask was the first to bring to the notice of botanists the peculiar *Lavatera assurgentiflora* of Anacapa Island which was described as new by Dr. Albert Kellogg (Proc. Cal. Acad. 1:14,—1854). Wherever his investigations took him about California he was likely to collect some plant of interest to his chief botanical friend. Kellogg writes that in a very early day Dr. Trask studied the native medicinal plants of western America and made known or discovered the virtues of such species as yerba santa (*Eriodictyon californicum*) for rheumatism, damiana (*Turnera aphrodisiaca* of Lower California) for nerve aberrations, *Grindelia robusta* for poison oak dermatitis, *canchulagua* (*Erythraea*) as an anti-febrile, manzanita leaves (native *Arctostaphylos* species) as an anti-lithic, as well as other indigenous plants.

He was born in Roxbury, Massachusetts, in 1824 and died at San Francisco July 3, 1879. His latter years were almost exclusively devoted to the practice of medicine in which, says Kellogg, he was professionally skilled and remarkable for originality and independent thought. With Kellogg and a few others, Trask was one of the founders of the California Academy of Sciences in 1853. At a meeting of the Academy on July 21, 1879, it was the gentle Kellogg that delivered his eulogy.

[Remarks of Dr. A. Kellogg on the late Doctor John B. Trask before the California Academy of Sciences, July 21, 1879. pp. 1-8. Audubon's Western Travels, pp. 1-249. 1906. A biographical sketch of Doctor John B. Trask, first state geologist of California, by Anthony W. Vogdes (Trans. San Diego Soc. Nat. Hist. 1:27-30,—1907). This contains a bibliography of his geological papers and a good portrait; the biographical matter appears to be mainly or wholly de-

rived from Kellogg's paper. Many of Trask's scientific papers were published in volumes 1 to 3 of the Proceedings of the California Academy of Sciences.]

CONSERVATION OF NATIVE PLANTS AND SENATE BILL NUMBER SIXTY-FOUR

F. F. BARBOUR

Botanists, students and others interested in the native flora of California, should study carefully the text of the above bill passed by the last California legislature. It is a well-intentioned effort to protect our native shrubs and plants, but is so drastic in its terms as to interfere seriously with the usual requirements of the botany courses of the Universities, and with the practices of scientific collection. It reads in part: "Every person who within the State of California, wilfully . . . cuts . . . or removes any native tree or shrub, or fern, or herb or bulb or cactus or flower, or any portion of any native tree, or shrub or fern or herb or bulb or cactus or flower, growing upon state or county highway rights of way, . . . shall be guilty of a misdemeanor and upon conviction hereof shall be punished by a fine of not more than two hundred dollars or by imprisonment in a county jail for not more than six months or by both such fine and imprisonment . . ."

It also provides that: "Every person who for commercial purposes wilfully cuts or removes any native tree, etc.," as in the above paragraph, is subject to the same fine or imprisonment. This expression "commercial purposes" might easily be made to apply to picking of flowers for the purpose of making sketches or photographs for inclusion in any manual of botany, or other book, or pictures to be sold.

There is no doubt in the mind of the writer but that certain of our native shrubs and flowers, such as *Escholtzia*, *Brodiaea*, *Photinia*, and some others, should be protected by an absolute prohibition for a period of years or by a very short open season and a rigid limitation of quantity taken, as is done in the case of wild game. It is suggested that a system of licenses as for fishing and hunting, limiting the number picked, could be used to regulate the present practice. The writer heartily believes in conservation, and has repeatedly urged it before schools, clubs and other groups, but he believes that the present law is too drastic and that it interferes seriously with legitimate scientific and educational work.

NOTES AND NEWS

A twelve-page leaflet recently issued by the Rancho Santa Ana Botanic Garden, Anaheim, gives a list of the councillors of the garden, the board of trustees and the garden staff. There is also a brief illustrated account of the activities of the garden.

Dr. Irma E. Webber presents a brief paper on the fossil woods of Last Change Gulch near Red Rock Cañon in Kern County. Four species are described as new; one *Pinus Kelloggii*, in honor of Miss

Louise Kellogg, should in terms of Latin grammar be *Pinus Kelloggiae*. The discussion of ecological conditions is a valuable one. (Carnegie Institution, Publ. 412, pp. 113-134.)

Dr. G. J. Peirce, Professor of Botany and Plant Physiology in Stanford University, retired from active duty on August 31, 1933. He is succeeded by Dr. L. R. Blinks, formerly of the Rockefeller Institute, who comes as Associate Professor of Botany to carry on the work in plant physiology. Dr. Blinks expects to spend the spring quarter at the Hopkins Marine Station where he will offer work in the physiology of algae. Dr. L. R. Abrams succeeds Dr. Peirce as chairman of the Department of Botany at Stanford.

Dr. W. S. Cooper, Professor of Botany at the University of Minnesota, and a student assistant, visited in August the important dune areas from the vicinity of Rosario, Baja California, northward to southern Washington. Professor Cooper's pictures from Baja California show extraordinarily large and symmetrical dunes, the finest of them being about two miles inland from the sea.—I. L. W.

A "Flora Hawaiensis" has been issued by the author, Otto Degener. It is a bit novel in its physical make-up, since the 332 pages and 106 plates are issued in loose-leaf form, though well bound.

A paper on the "Pleistocene flora from the asphalt deposits at Carpinteria, California," by Ralph W. Chaney and Herbert L. Mason has been published by the Carnegie Institution. This fossil flora, as described, comprises 25 species, a majority of which are found today as living species in the Monterey pine forest 200 miles to the north.

A paper on the Lower California buckeye, *Aesculus Parryi*, by Ira L. Wiggins, appeared in the American Journal of Botany for May, 1932.

The American Journal of Botany for October, 1932, contains a paper by Flora Murray Scott on the anatomy of *Fouquieria splendens*, the peculiar ocotillo or candle bush of the Colorado desert.

Eichornia crassipes has been reported from a pond near Centreville, Fresno County, by C. Condit, in July, 1933. Since this species is so serious a menace, botanists would do well to report its occurrence in any navigable stream or tributary of such to the California Department of Agriculture, Sacramento, or to the California Botanical Society at Berkeley.

Miss Fidella G. Woodcock, Curator of the Herbarium at the San Diego Natural History Museum, died April 24, 1933. Miss Woodcock had previously been Curator at the Pacific Grove Museum many years ago.

Mr. Victor Duran of the University of California collected again in the Owens Valley region and also in the San Gabriel Mountains during the summer of 1933.

Professor A. S. Colby, Department of Horticulture, University of Illinois, Urbana, wishes to secure some one native "species of California gooseberry with a deciduous calyx". It would seem that such a condition does not occur for any species except possibly as an abnormality or a mutant.

During the year 1933 the following new members were added to the roll of the California Botanical Society: Mr. Elmer I. Applegate, Dudley Herbarium, Stanford University, Dr. Priscilla Avery, Department of Botany, University of California, Dr. Frederic E. Clements, Mission Cañon, Santa Barbara, Mr. Lincoln Constance, Department of Botany, University of California, Dr. Herbert F. Copeland, Sacramento Junior College, Sacramento, Miss Mary L. Courtright, Larkspur, Mr. Joseph Ewan, Department of Botany, University of California, Mr. W. I. Follett, Piedmont, Prof. E. S. Fritz, Department of Forestry, University of California, Mr. Wilfrid T. Frost, Berkeley, Miss Alice Handschiegel, Mills College, Mr. L. H. Henderson, Curator of the Herbarium, University of Oregon, Mr. William Heusi, Carnegie Institution Laboratory, Stanford University, Dr. R. M. Holman, Department of Botany, University of California, Miss Annie S. Miller, Piedmont, Miss Docia I. Patchett, Santa Rosa, Mr. Clarence Quick, Department of Botany, University of California, Miss Emily Smith, San Jose Teachers' College, Mr. Palmer Stockwell, Dudley Herbarium, Stanford University, Miss Ethel Walker, Berkeley.—E. K. CRUM.

Miss Elizabeth H. Smith, Plant Pathologist in the Agricultural Experiment Station, University of California, Berkeley, died August 21, 1933. She was killed by a motorist in the streets of Berkeley. Dr. Anstruther Davidson of Los Angeles died April 3, 1932. He was also killed by a motorist, though he did not die immediately after being struck. Several years ago Dr. N. L. Gardner of the University of California, when engaged in an act of courtesy in the Berkeley streets, was severely injured by a motorist, but happily recovered. From general observation of the habits of motorists and holding in view the number of persons killed by them, it seems fair to suppose that a substantial majority of motorists are indifferent to life and limb until after the event. In the first six months of this year, 1036 persons were killed in California and 20,046 injured during the same period. Something over 29,000 persons were killed in the United States in 1932 and over 900,000 were injured. Plant lovers are fundamentally pedestrians and we feel impelled to urge upon our fellow botanists such precautions for safety as would be needful in another age, euphemistically called "savage", where life was daily in danger from carnivorous animals or some similar menace. Miss Smith had been connected with the University of California since 1905 and was for long a member of this Society and one of its officers, Dr. Davidson was the senior of Southern California botanists and in his intimate circle at Los Angeles was much beloved. A biography of him will appear later in this journal. The serious injury of Miss Alice Eastwood by a motorist was noticed in the October, 1931, issue of Madroño.

THE DWARF GAULTHERIAS IN CALIFORNIA

LEROY ABRAMS

The two dwarf Gaultherias, *Gaultheria humifusa* (Graham) Rydb. and *Gaultheria ovatifolia* A. Gray, of the Northwest are rare in California, being locally distributed in Humboldt and Del Norte counties in the northwestern part of the state and in a few localities in the High Sierra. They have been collected only rarely, so it is not surprising that the presence of both species within our state boundaries has been overlooked, or that the two species have been confused.

In order to help clear up the record on these two interesting dwarf shrubs the following diagnostic characters and distribution notes are offered: Both species are readily separated from the common salal, *Gaultheria shallon* Pursh, not only by their low dwarf habit and smaller leaves but by well marked floral differences. Their flowers are campanulate and solitary in the upper axils on short bracted peduncles, and the filaments are glabrous. Whereas in the salal the flowers are urceolate and arranged in elongated, many-flowered, terminal or sub-terminal racemes, and the filaments are hairy.

Calyx glabrous; leaves oval, about 10 mm. long or the larger often 15 mm. long, entire or obscurely serrulate.....*G. humifusa*

Calyx pubescent; leaves ovate or subcordate, 20-40 cm. long, distinctly serrulate*G. ovatifolia*

GAULTHERIA HUMIFUSA (Graham) Rydb. Alpine Spicy Wintergreen. *Vaccinium humifusum* Graham, Edinb. New Phil. Journ. 11:193. 1831. *Gaultheria myrsinites* Hook. Fl. Bor. Am. 2:35. 1834. *Gaultheria humifusa* Rydb. Mem. N. Y. Bot. Gard. 1:300. 1900.

Low shrub with creeping stems, the branches mostly less than 10 cm. high, slender, glabrous or puberulent. Leaves oval to round-oval, or rarely ovate-oval, the larger rarely over 15 mm. long, obtuse at apex, obtuse or rounded at base, entire or obscurely serrulate; petioles very short; flowers solitary in the leaf axils, on short bracted peduncles; calyx 2.5 to 3 mm. long, and nearly as broad, toothed to near the middle, glabrous; corolla slightly exceeding the calyx-lobes; fruiting calyx enlarged forming a fleshy berry-like fruit, 5-7 mm. in diameter, scarlet, and spicy-flavored.

Grows on moist mossy slopes or on the edges of wet meadows, mainly in the Hudsonian Zone, near timberline. The general geographical range is from British Columbia and Alberta to Colorado and California. In California the species has been collected only twice to my knowledge: once by Mrs. M. Strong Clemens in the Granite Basin, Kings River region, July 1910, and again by Peirson, No. 2530, in

MADROÑO, vol. 2, pp. 121-128. Apr. 1, 1934. [The date line for the issue of Oct., 1933, page 105, should read: vol. 2, pp. 105-112. Oct. 21, 1933. The date line for the issue of Jan., 1934, p. 113, should read: vol. 2, pp. 113-120. Jan. 1, 1934.]

Grouse Meadows, LeConte Cañon, Aug. 13, 1921. Both of these stations are in the southern Sierra Nevada.

GAULTHERIA OVATIFOLIA A. Gray. Oregon Spicy Wintergreen. *Gaultheria ovatifolia* A. Gray. Proc. Amer. Acad. 19: 84. 1883.

Low shrub with procumbent stems and erect or ascending branches, seldom over 15 cm. high, the branchlets, petioles and calyx pubescent with loosely spreading hairs. Leaves ovate to broadly ovate, the larger 20-25 mm. long, acute at apex, abruptly rounded or subcordate at base, distinctly serrulate; flowers solitary in the leaf axils, on short bracted peduncles; calyx 3 mm. high, the lobes exceeding the tube, acute; corolla campanulate, 3.5 mm. long, white; berry globose 4-5 mm. in diameter, scarlet, spicy-flavored.

This species inhabits the coniferous forests of the Humid Transition and Canadian Life zones. The general geographical distribution extends from British Columbia to northern Idaho and southward on the Pacific Slope to the Siskiyou Mountains of southern Oregon and northern California. The following collections from California have been examined: head of Redwood Creek, Humboldt County, *Chesnut & Drew*, Aug. 6, 1888; Horse Mountain, Humboldt County, *J. P. Tracy* 7670; Bartlett Trail to Preston Peak, Del Norte County, *Dudley*, July 6, 1899; Bear Wallows, 2 miles north of Sanger Peak, alt. 4500 feet, *Kildale* 8790; Klamath Range, near Preston Peak, *Jepson* 2878. A fragmentary specimen with only a few immature leaves, collected by C. B. Bradley at Scales Diggins, near Poverty Flat, Sierra County, seems referable to this species; but the material is too incomplete to make a definite determination.

TERATOLOGY IN WILLOWS

CARLETON R. BALL

The willows, in common with other plants, afford numerous instances of abnormal or teratological morphology. This may be shown by stems, leaves, aments, or flowers. Brief mention of a few may interest both professional and amateur botanists to observe others.

DIAMOND WILLOWS. The term is applied to stems in which the scars left by the atrophy of branchlets do not become overgrown by new tissue but remain and increase in size with the enlargement of the stem. In the more perfect specimens the resulting diamond-shaped depressions are regularly arranged on the stem according to the normal phyllotaxy. Some species of the American section *Cordatae*, especially *Salix lutea* of the Rocky Mountains and westward, are known to exhibit this phenomenon. In 1931 Professor W. A. Setchell of the University of California discovered that *Salix alaxensis*, the widely distributed tree willow of Alaska, also forms the diamond scars. He has presented to the writer a most beautiful cane made from a stem obtained among the Indians at Gulkana, and has given to the Department of Botany a small log section from a larger trunk.

LEAF VENATION. In *Salix* leaves the midvein normally is unbranched, but occasionally divided midveins are observed. More noteworthy and more difficult of explanation are occasional extra veins which seem to bear no regular relation to the midvein or the primaries but to cut across both at varying angles. These usually are visible only on the under surface of the leaf. They have been noted in a few species, especially *Salix subcoerulea* of the western United States.

BRANCHING AMENTS. These occur but rarely. The branch usually arises from the basal third of the rachis. These should not be confused with multiple aments. Several species of the longleaf or sandbar willows, section *Longifoliae*, commonly produce from 2 to 4 aments at the end of a single peduncle or leafy shoot. Although crowded closely together, these aments are separate and distinct.

HERMAPHRODITE WILLOWS. Willows normally are dioecious but plants with aments containing flowers of both sexes are not uncommon. Sometimes the flowers are perfect, that is, having stamens and a pistil in the same flower. More frequently the flowers are unisexual but those of the two sexes are intermingled. In such cases staminate flowers usually predominate in the proximal or lower part of the ament and pistillate flowers in the distal or outer portion. Very commonly, and perhaps as a result of inter-specific hybridization, the flowers of both sexes will be monstrously deformed in a variety of ways and degrees. There is an extensive literature on willow hermaphroditism.

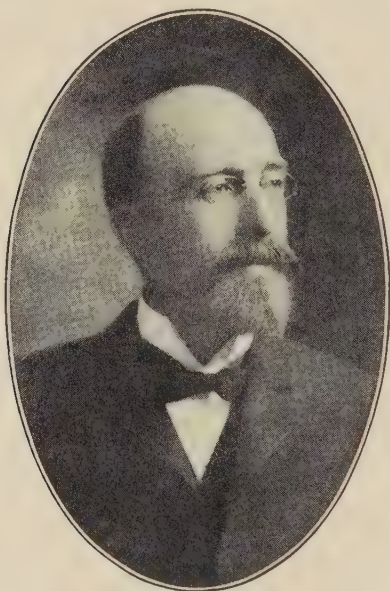
PROLONGED AMENT RACHIS. A rare and noteworthy teratological expression has just been brought to notice by Joseph P. Tracy, the veteran botanist of Eureka, Humboldt County, California. On a specimen of the newly described *S. Scouleriana* var. *coetanea* Ball collected by him on South Fork Mountain in Trinity County, California, in July, 1933, two pistillate aments show a prolongation of the ament rachis into a leaf-bearing branchlet. In one ament the process has just begun, a single rudimentary leaf appearing at the apex of the rachis among the terminal capsules. In the other the rachis has elongated into a branchlet about 1 cm. long and bearing one nearly orbicular leaf about 5 mm. long and four nearly normal but just expanding, narrowly obovate leaves from 1 to 1.3 cm. long. Their margins are rather closely sinuous-serrulate, a character not uncommon in the species but relatively absent in similar leaves of normal branchlets on this specimen. The branchlet bearing these leaves is somewhat swollen at its union with the tip of the rachis but it shows no sign of a joint or abscission layer such as occurs at the junction of seasonal shoots and the older stem. It is densely white pubescent like the rachis rather than thinly so like the normal branchlets. Its small leaves also are slightly more pubescent than those of similar size on normal branchlets. There is a slight possibility that the swelling represents an insect attack which stimulated vegetative growth without brachyism and consequent gall formation, but this seems hardly likely, especially as galls have never been observed by the writer at the tips of aments or indeed on aments at all.

University of California, Berkeley, December 4, 1933.

ANSTRUTHER DAVIDSON: AN APPRECIATION

JOSEPH EWAN

"He is a man full of interest—not 'shelved,' nor cynical, nor disappointed with life, but a trifle melancholy and above all full of sifted wisdom." This is my recorded appraisal upon returning home from my last visit with Dr. Davidson just two months before his death on



ANSTRUTHER DAVIDSON

April 3rd, 1932. "He sat in his easy rocker — the old cherry-wood sort, with stationary base—and between draughts on his made-as-needed cigarettes, foiled rather carelessly and twisted in the manner of taffy wrappers, he told of other days and California botany. His terse phrases concerning Hasse, Greata, Parish and others were flavored with personal understanding and accented with measured strokes of his goatee. His face is slender and sharp-featured, but set with eyes full of brightness."

Anstruther Davidson was born at Watten, Scotland, on February 19, 1860, being the son of George and Ann (Macadam) Davidson. He graduated in medicine from

the University of Glasgow with the degrees of M(edicinae) B(accalaureus) and C(hirurgiae) M(agister) at the age of twenty-one. Six years later he obtained his M.D. (1887). He emigrated to America two years later and in the same year began the practice of medicine in Los Angeles which was carried on practically continuously until his death. A dermatologist in the medical field, he was at one time assistant professor of that subject at the University of Southern California. He was a fellow of the American Medical Association. His skill in his chosen field was the basis of the regular visits made to the Good Samaritan Hospital of Los Angeles, when no longer in active practice, as consulting dermatologist, a schedule continued up to his last brief illness. During the preceding January Dr. Davidson was struck by an automobile and thrown forward to the pavement, suffering internal injuries, doubtless of a more serious nature than early realized, which were the almost certain cause of his death some three months later at the age of seventy-two.

In the fields of systematic botany and entomology Anstruther Davidson will certainly be permanently remembered for the early studies he carried out in these subjects in Southern California. His entomological papers cannot be considered here but reference to the author index of Essig's *Insects of Western North America* will attest to his contributions in that field. He was a corresponding member of the Entomological Society of Philadelphia.

Davidson's botanical activities were carried out principally through the Southern California Academy of Sciences and through the medium of its *Bulletin*. He served as the second president of the society, from 1892 to 1894, being re-elected for a second term. He was among the founders of the society and served as treasurer, as a member of the board of directors and of the publication board. In short he was an active associate for forty-one years.

As the leader of the Academy's Botanical Section meetings he will be long remembered by those who enjoyed the discussions centering about plant materials brought in by members and interested persons. New or rare plants were brought to light in this way: *Fremontodendron mexicanum*, for example, was brought to a meeting by Theodore Payne and Dr. Davidson recognized its distinctness.

Of the acceptance of Davidson's published botanical studies there will be certain disagreement, particularly as to the "fineness of species," but there can never be doubt as to his sincerity. He had well founded ideas in mind when proposing new taxonomic units and a close study of the Southern California flora bears out in most instances the value of his proposals, though too strongly accented at times. It was in the genera *Mentzelia*, *Allium*, and *Lupinus* that he made the greater number of proposals. His close study of the weed population about Los Angeles correlated splendidly with that of Parish about San Bernardino to give an exceptionally complete account of the immigrant element in the flora of the region. On the basis of a rather extended stay at Clifton, Greenlee County, Arizona, he published the only account of the flora of Arizona that has yet appeared, being an attempt to give synoptically but completely a list of the plants of a relatively small area.

His most extensive work, done in collaboration with George L. Moxley, was the "*Flora of Southern California*" published in 1923. Unfortunately this book was moved into print too hastily to eradicate the many errors that appear, chiefly in the citation of the authors of binomials, but it serves, nevertheless, as a stimulus to the more ambitious explorers of the Southern California flora. By its citation of definite localities for lesser known species, a new station for a plant is at once recognizable, and in this way it has distinctly energized the study of our native plants.

Dr. Davidson's herbarium was donated before his death to the Los Angeles (County) Museum of Art, History and Science. He was a member of the board of governors of the museum for twenty-two years. It is a highly interesting herbarium, for although he did not attempt to exchange widely, there are many sheets of considerable value, acquired by exchange from contemporary California collectors. His

own collections were rather widely but thinly distributed; there being material at the University of California, at the Dudley Herbarium of Stanford University, the United States National Herbarium and certain selected items at the Gray Herbarium.

Many botanists have commemorated Davidson in the naming of his California or Arizona collections. Thus Greene has named an *Eriogonum* and *Lotus* for him; Abrams, an *Acrolasia* (*Mentzelia*) and *Calochortus*; Parish, a little-known *Collinsia*; and Robinson, the endemic *Malvastrum* of the San Fernando Valley region. In his profession Anstruther Davidson was preëminent, and in his scientific contributions, of pioneering importance in a manifestly little-harrowed field of study. Thus he remains in California's progress.

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University of California, Berkeley, December, 1933.

NOTES AND NEWS

The Death Valley region, well-known to botanists for its vegetative features and ecological interest, was created a national monument by President Hoover on February 11, 1933.

Under the title "More New Plants from Oregon," Professor Morton E. Peck of Williamette University publishes twelve new species of spermatophytes from the state of Oregon (*Torreyia* 32:147-153).

Miss Elizabeth Morse, who for several years has been engaged with investigations on the Pacific Coast fungi at the University of California, has provided funds for assistance in the mycological department of the University Herbarium. Miss Vera Mentzer, graduate student in botany at the University of California, has been chosen to do this work.

The National Research Council has granted a fellowship to Dr. David Goddard of the Department of Botany, University of California. Dr. Goddard left in August, 1933 for New York City where he will carry on his studies at the Rockefeller Institute.

Miss Mary L. Bowerman, graduate student in botany at the University of California, has undertaken a study leading to a comparison of the flora of the Marquesas Islands with those of the Society, the Samoan, and the Hawaiian Islands. This work is being done in connection with the Pacific Entomological Survey, which is under the direction of Dr. Edward P. Mumford of Honolulu.

THE RANUNCULUS HYDROCHAROIDES GROUP IN CALIFORNIA

LYMAN BENSON

Scattering specimens of *Ranunculus* belonging to the section *Flammula* of *Euranunculus* collected in the extreme northern end of California have been mentioned in botanical works as plants of uncertain classification. Examination of the material of the various Pacific Coast herbaria and of the United States National Herbarium has served to link these puzzling California plants with species occurring in restricted areas in Idaho and Oregon and with *Ranunculus hydrocharoides* of regions from Arizona southward. The three species of the *Hydrocharoides* group are distinguished from the typical *Flammula* group most readily by the fact that the cauline leaves are ovate or ovate-lanceolate rather than lanceolate, oblanceolate, or linear.

KEY TO THE SPECIES

Stems rooting at the nodes; flowers never in cymes.

Roots with no thickening at the base; stems distinctly fistulous, inflated, usually at least 4 mm. thick.....1. *R. hydrocharoides*.

Roots each with a light-colored, fusiform thickening at the base; stems filiform, 1 mm. thick.....2. *R. Gormanii*.

Stems never rooting; flowers usually in cymes; roots each with a small, light-colored, fusiform thickening at the base.....3. *R. Populago*.

1. *RANUNCULUS HYDROCHAROIDES* A. Gray, Mem. Am. Acad. II. 5: 306. 1854.—Owens Lake, California, according to A. Gray; southern Arizona; southwestern New Mexico; northwestern Mexico. Type collection: "In wet marshes, Mabibi, Sonora, June, 1854," *Thurber*.

2. *RANUNCULUS GORMANII* Greene, Pittonia 3: 91. 1896. (*Ranunculus reptans Gormanii* Davis, Minn. Bot. Studies 2: 498. 1900. *Ranunculus terrestris* Wynd, Torreya 30: 53. 1930.) Glabrous perennial; roots slender, each tapering outward from a small fusiform base; stems prostrate, stolon-like, 1-2 dm. long, rooting usually at 2 or 3 nodes, filiform; basal and cauline leaves alike, broadly ovate to deltoid-ovate, 20-30 mm. long, 15-22 mm. broad, entire, thin and flaccid, 3-nerved; peduncles terminal or nearly so; sepals spreading, ovate, 2-3 mm. long, glabrous; petals 5, bright straw yellow, 5 or 6 mm. long; achenes 6-15, 1.5 mm. long, glabrous, smooth, somewhat compressed, slightly margined, beak evident, curved at the tip; receptacle short, not enlarged in fruit.—Boggy mountain meadows, Hudsonian Zones: Cascade Mountains from the Three Sisters, Oregon, to the Siskiyou and Klamath mountains, California; 2,000 meters elevation. Type collection: "on moist banks at Cathedral Springs, Crater Lake, southern Oregon . . . M. W. Gorman." California specimens: Siskiyou Mountains, *Howell* in 1884; Marble Mountain, *Chandler* 1552.

3. *RANUNCULUS POPULAGO* Greene, Erythea 3: 19. 1895. (*Ranunculus Cusickii* Jones, Proc. Calif. Acad. II. 5: 615. 1895.) Flaccid and glabrous perennial; roots fleshy, with a light-colored, fusiform thickening at the base; stems 1 or 2, reclining or suberect, 1-4 dm. long, growing rapidly during anthesis; basal leaves round-reniform to cordate-ovate or ovate, 3-5 cm. long by 3-6 cm. broad, denticulate, thin, petioles 5-15

cm. long; cauline leaves opposite, rarely alternate in specimens mostly from the southern part of the range, deltoid-ovate or ovate-lanceolate; peduncles 3-10 cm. long; flowers usually in true cymes; sepals spreading, rounded, 2.5-4 mm. long; petals 5, yellow, spatulate with a rounded apex, 8 mm. long; achenes in a hemispherical head 3-4 mm. in radius, obovate, 1.5 mm. long, glabrous, beak straight, one-third the length of the body; receptacle short, a little enlarged in fruit.—Mountain meadows, Canadian Zone: Idaho; Blue Mountains, Washington; mountains of Oregon; Siskiyou County, California, southward to the Sierra Nevada in Butte County. Type collection: "Mountains of Oregon." Eagle Creek, Wallowa Mountains, *Cusick* 1161. (cf. *Pittonia* 3: 14. 1896.) California specimens: Dead Horse Canyon, Siskiyou County, *M. S. Baker* in 1899; Colby, *Austin* 180; Jonesville, *Babbett* in 1923.

THE BOTANICAL EXPLORERS OF CALIFORNIA.—X.

WILLIS LINN JEPSON

Rachel Merritt Austin

A small group of naturalists lived in Plumas County in the northern Sierra Nevada of California during the sixties and seventies of the last century. One of these was Rachel M. Austin. Born in Cumberland County, Kentucky, on March 10th, 1832, Rachel Merritt Smith



RACHEL MERRITT AUSTIN

was reared in Platt County, Missouri, and went to a subscription school in the winter. Left an orphan at an early age, removal with her new parents to Illinois gave better opportunities and at sixteen she herself taught school in summer and with the means thus acquired attended the Granville Academy in the winter. At this academy perfectly marvelous subjects were open to the young and eager girl—subjects unheard of in the country school, namely Latin and the natural sciences, including Chemistry, Astronomy and Botany. Here in Illinois she met and married Dr. A. Leonard, a physician, and after his death and the financial crash in 1857 she went to Kansas and there wedded J. T. Austin. With him and

her children she came to California, arriving at the gold mines on Black Hawk Creek in Plumas County by means of sleds and snowshoes in 1865. Here the family remained for ten years and then moved to

the neighboring Butterfly Valley, six miles from the county seat town of Quincy. Mrs. Austin began to study the native vegetation in 1866 and continued to collect until about 1900. Early in 1872, she was visited by John Gill Lemmon of Sierra Valley, then a book peddler. Those who knew the exuberant Lemmon will readily credit the story as related by Mrs. Austin. When he saw a small cabinet made from a soap box which Mrs. Austin had filled with minerals, insects and plant specimens, he took off his hat and gave three cheers for the woman who was cooking for miners and at the same time trying to study nature under such adverse circumstances.

This new land was a botanical paradise, revealing a beautiful flora as yet almost unmarred by civilized man and his activities. One of the first plants to attract deep interest was the singular California Pitcher Plant, *Darlingtonia californica*. The residence in Butterfly Valley gave opportunities for special work upon it and the study was continued for many years. Mrs. Austin's experiments upon the nature of the digestive fluid were the first to be made upon this species and have been well summarized by Frank Morton Jones, a specialist on the pitcher liquor of the Sarraceniaceae and its biochemistry. He writes: "Mrs. Austin's letters to W. M. Canby of Wilmington, Delaware, number twenty, and in date extend from Feb. 9, 1875 to March 6, 1877. Some of them are many pages in length, five of them more than a thousand words each, one of about three thousand words. They give in detail her experiments and observations on *Darlingtonia*, with occasional reference to other plants. Most of her observations on *Darlingtonia* seem to have been made without suggestion from others—most were original and first discoveries in regard to that interesting plant. Recognizing its carnivorous nature, her experiments related mainly to its trap structure. She discovered and mapped the distribution of the nectar exudation upon the pitchers, determining that this sometimes took place for two successive seasons upon the same pitcher. She detected the fluid in the bottoms of *closed* pitchers, hence identifying it as a secretion of the plant; determined that it increased greatly in quantity upon the capture of insect prey, which suggested to her the introduction of nutrient matter (such as raw meat) into the pitchers, and she recorded the surprising response in the pouring out by the leaf of a great quantity of fluid. She concluded that the nectar bait had no stupefying qualities and that the pitcher-fluid has no digestive power, but that decomposition rather than digestion takes place in the pitchers. By necessarily crude experiments, she determined that under some circumstances absorption takes place in the pitcher cavity. By sitting among the plants through the rare event of a summer thunder-shower, she confirmed her belief that the entrance of rain-water is precluded by the pitcher structure. She was highly elated by the discovery that the age of an individual plant may be determined, by counting the leaf-base attached to the rhizome. She made prolonged observations upon the pollenizing insects; and especially upon the dipterous larvae which inhabit the pitchers, feeding upon the captured insects. Her observations began before she had any literature whatever in

regard to insectivorous plants; and not until 1875 did she have even a hand lens, her letter of March 22 of that year requesting that Mr. Canby send her one. On *Drosera*, too, she made interesting original observations, and in one of her letters I find the statement that 'My notes on *Drosera rotundifolia* were published in our county paper.' This was in 1875 or earlier. Mrs. M. A. Hail, her daughter, has given me a lead-pencil note of her mother's observations upon this plant, which includes one curious motion of the leaf which, Dr. J. M. Macfarlane tells me, has been recorded for *Dionaea* but never for *Drosera*."

There was also some contemporaneous reference to these experiments. Asa Gray in *Darwiniana*, page 330, gave Mrs. Austin credit for having made "the principal observations upon this pitcher plant." Brief notes by Mrs. Austin herself appeared in the *Botanical Gazette* (3: 70-71, 91,—1878), while Mary E. P. Ames in the *California Horticulturist and Floral Magazine* (10:225-229,—1880) reports something of the work in Butterfly Valley and the demonstration of the response of the pitchers to the introduction of nutrient matter.

It was chiefly in the neighborhood of her places of residence that collections were made of the native plants. The family lived in Butterfly Valley from 1873 to 1878. In 1878 a move was made to Big Meadows, where came William M. Canby, of Wilmington, to see this Sierran botanist on account of her work on *Darlingtonia*. About 1881 another move was made to Davis Creek, Modoc County, where the family remained for about thirty years. An abounding vitality characterized this woman and the frontier was much to her liking. Putting a collecting press on her back she started off on foot into the wilds with a botanical pick, making many discoveries of new plants, as well as laying the foundations by herbarium specimens for a knowledge of the flora of northeastern California. In the mountain forests of Plumas County she was the first to collect a remarkable white saprophyte, the strange orchid *Cephalanthera Austinae* (Gray) Hel. In her honor was also named *Lomatium Austinae* C. & R.

In the school days at Granville Academy Mrs. Austin had taken an especial interest in human physiology, an acquirement which was strengthened by her marriage to the physician, Dr. Leonard. Such training as this was fortified by strong sense and by natural gifts, so that she became in the wide wilderness of the Modocs an informal physician to the scattered settlers who had no regular medical aid. It is still told in the county that on the occasion of a typhoid epidemic she cared for fourteen sick persons and lost not one.

It may well be said of her that she was more than an admirer of the beauty of the native flowers. The temper of her mind and the nature of her education gave the power of scientific thinking, cautious, restrained and reasoned, as any one may see who reads her brief article on *Sarcodes sanguinea* (*Bot. Gaz.* 8:284-285) or her equally brief notes on *Darlingtonia*. That she was valued by botanists as a collector and observer is attested by her correspondence, wherein are found letters from Sir Joseph Hooker, Asa Gray, E. L. Greene, D. C. Eaton, Sereno Watson and several others.

In 1908 she and Mr. Austin moved to Chico and there she died March 14, 1919. The first student and collector of the native plants in Modoc County, an explorer as well in Shasta, Tehama, Plumas and Lassen counties, she also made two expeditions to the southern Cascades in Oregon, everywhere collecting specimens which were distributed to many important herbaria in the United States and Europe. As a pioneer woman botanist of early day California she is the finest and most outstanding type.

Lorenzo Dow Jared

In the extreme interior of San Luis Obispo County, L. Jared discovered some forty years ago a singular *Lepidium* which was named *Lepidium Jaredii* in his honor by T. S. Brandegee (*Zoe* 4:398,—1894). It is the rarest of California *Lepidiums*, and is one of many interesting

plants gathered in the region by L. Jared. He lived on the Estrella plain of San Luis Obispo County and after many years' study made a list of the native plants of the region which is the first list for any part of that wide interior and is still in existence in manuscript.

He was born near Abingdon in Illinois on August 6, 1832, and entered Prairie College, which later became Knox College, as a freshman in 1853. He took the regular classical course and was a student of Latin, Greek, Mathematics and Philosophy. Afterwards he became a medical student in New York City, but took his M.D. degree on January 30, 1857, at the Eclectic Medical College in Cincinnati. In the closing year, 1865, of the Civil War, he



LORENZO DOW JARED

served as assistant surgeon to the Twenty-third Illinois Regiment. He came to California in 1870 and settled at Los Angeles, later moving to Santa Barbara County. The novel native plants which he sent to Asa Gray during this period are occasionally noticed in the Synoptical Flora. From about 1883 to 1894 he lived at Estrella. While resident here he wrote a series of articles on uses of the native plants for the San Luis Press, a newspaper at San Luis Obispo. *Peucedanum Jaredii* and *Navarretia Jaredii* from San Luis Obispo County were named for him by Alice Eastwood (*Zoe*, 5:88-89). He died August 3, 1909.

CRITICAL NOTES ON ERIOPHYLLUM LAG.—I

LINCOLN CONSTANCE.

The status of *Eriophyllum caespitosum* Douglas.

The writer has recently had the privilege of examining specimens (loaned by the Royal Botanic Gardens at Kew) collected in the Pacific Northwest over a hundred years ago by David Douglas. The study of these has brought to light several misconceptions which have persisted in the literature of the genus, and have been a source of confusion to taxonomists.

The original description of *Eriophyllum caespitosum* Dougl. (1) attributes to this species a decumbent habit, a gamophyllous involucre, and a short, "4-toothed" pappus. These characters have led to the association of this name with the California coastal plant, *Bahia arachnoidea* of Fischer and Ave-Lallement (2) and *Bahia latifolia* of Bentham (3). In the North American Flora (4), Rydberg revived *Eriophyllum caespitosum*, and reduced to synonymy with it these two binomials and certain later names derived from them.

Examination of what is assumed to be part of Douglas' original collection, in addition to specimens grown in the garden of the Horticultural Society of London from seed transmitted by him, reveals certain discrepancies in the original description. It is difficult to ascertain from these the nature of the habit, but the stems would appear to be very nearly erect. The involucral bracts are either quite distinct, or, possibly, very slightly united at the base. The pappus, on those achenes examined, consists of about 8 unequal paleae, the alternate ones lanceolate and acute, about 0.7 mm. long, the others oblong and obtuse, erose, about 0.5 mm. long. This is a very different condition from the vestigial toothed crown, characteristic of the Californian plants. Finally, the glabrous achenes are not turbinate, but narrowly oblong, tapering gradually; nor are the leaves rhombic, with a broadly cuneate entire base, incisely lobed or decurrently pinnatifid at or above the middle, but merely ovate and deeply pinnatifid with oblong, obtuse divisions.

The re-described characters, together with those of foliage and achenes, reveal that these specimens are typical of the Northwest, and not of California. The first of the former population to be described were the specimens collected by Lewis, "on the high banks of the Kooskoosky" (Clearwater River, Idaho County, Idaho), June 6, 1806. These were the basis for Pursh's *Actinella lanata* (5), a specific name which has been passed from genus to genus, finally to become *Eriophyllum lanatum* Forbes (6). In making this combination, Forbes considered *Eriophyllum caespitosum* Dougl. a synonym of *Eriophyllum lanatum*, and was followed in this by Gray (7), but Gray (8) subsequently reversed the status of these two names. Although the type of *Actinella lanata* Pursh (known to the writer through a photograph taken by Dr. C. C. Epling) differs from Douglas' material in a few minor details, it is undoubtedly a representative of the same population.

Thus, *Eriophyllum caespitosum* Dougl. becomes a synonym of *Eriophyllum lanatum* (Pursh) Forbes. As to the plant of the California coast, the first name unmistakably attributed to it was *Bahia arachnoidea* F. & L., described from the products of seeds collected at Fort Ross. Greene (9) altered this to *Eriophyllum arachnoideum*, and Jepson (10) modified it to *Eriophyllum lanatum* var. *arachnoideum*, with which the opinion of the writer is in full accord.

- (1) Lindl. Bot. Reg. 14: 1167. 1828.
- (2) Index Petrop. 9: 63. 1842.
- (3) Bot. Voy. Sulph. 30. 1844.
- (4) N. Am. Fl. 34: 90. 1915.
- (5) Fl. Am. Sept. 560. 1814.
- (6) Hort. Woburn 183. 1833.
- (7) Bot. Cal. 1: 381. 1876.
- (8) Am. Acad. Proc. 19: 26. 1883.
- (9) Man. Bot. Reg. S. F. Bay 207. 1894.
- (10) Man. Fl. Pl. Cal. 1119. 1925.

University of California, Berkeley, December, 1933.

OPEN LETTERS

The Knob-cone Pine

While on a recent hike through the foothills west of Yosemite National Park I noted a possible extension of the range of the knob-cone pine. All information available to me here indicates that the north side of the Merced River is its southernmost limit in the Sierra Nevada. Hence an observation on the opposite side of the river, five miles south of previous records, seemed noteworthy. The knob-cone pine occurs there in Section 34, T3S, R19E, at an elevation of 3800 to 4000 feet, this being the highest point in Section 34. The occurrence consists of a dense stand of young trees 10 to 20 feet high, covering about three acres, and growing on an eastern exposure. There are also scattering trees extending over perhaps 40 acres of the adjacent southern exposure.—CLIFFORD PRESNALL, Yosemite, Nov. 10, 1932.

Juglans Hindsii

On page 120 of Jepson's "Flora of Western Middle California", 2d edition, the California black walnut, *Juglans californica*, var. *Hindsii* Jepson, is described as growing on Walnut Creek, on the lower Sacramento River, and also in the Napa Range.

My cousin, Mr. L. D. Anderson, who lived in Pacheco, Contra Costa County, for nearly 75 years, tells me that there are several very large California black walnut trees growing on the Harry Keller ranch, formerly the Clayton ranch, at the town of Clayton, Contra Costa County. One of these trees is larger than any of the trees growing along Walnut Creek and the nuts, he says, are twice as large as those on the latter trees. Mr. Anderson tells me that Mr. Ed. Smith, pioneer walnut grower in the Ignacio Valley, always gets the nuts of this large tree to grow the "foundation" trees upon which he grafts "English" walnuts.—EDWARD P. E. TROY, San Francisco, Dec. 28, 1931.

NOTES AND NEWS

Mr. L. F. Henderson, Curator of the Herbarium, University of Oregon, and Mr. Lincoln Constance, Department of Botany, University of California, made a collecting trip in July, 1933, to the Warner Mountains of southeastern Oregon, with an especial view to the distribution of *Eriophyllum*.

Mr. A. C. Smith, Assisant Curator of the New York Botanical Garden, Dr. Edwin Cheel, Curator of the National Herbarium, Sydney, New South Wales, Dr. W. H. Judd of the Arnold Arboretum, Harvard University, visited the University of California Herbarium during the summer of 1933.

On June 30, 1934, two members of the Department of Botany of the Univeristy of California, Dr. William A. Setchell and Dr. Nathaniel L. Gardner retire from active service. Dr. Setchell came to the University in 1895, and as Chairman of the Department has thus served for nearly forty years. Dr. Gardner, Associate Professor of Botany and Honorary Curator of the Herbarium, became a member of the Department in 1900, and except for one interval of seven years, between 1906 and 1913, has been in continuous service since. Dr. Setchell and Dr. Gardner have long been associated in researches upon the Pacific Coast algae.

California Botanical Society Meetings.—The meetings reported below were held in Room 2093, Life Sciences Building, University of California, Berkeley, at 8:00 p. m.

Thursday, October 19, 1933. Dr. L. R. Abrams, Department of Botany, Stanford University: "Botanizing in Europe."

Thursday, November 16, 1933. Professor H. E. McMinn, Department of Botany, Mills College: "Plant Pollens in Relation to Hay Fever."

Thursday, December 14, 1933. Dr. David D. Keck, Carnegie Institution Laboratory, Stanford University: "Current Investigations in Experimental Taxonomy." At the business meeting which preceded the lecture, officers of the society for 1934 were nominated. The report of the nominating committee, read by Dr. L. R. Abrams, chairman, was as follows: President, Dr. George J. Peirce; First Vice President, Professor H. E. McMinn; Second Vice President, Dr. H. L. Mason; Treasurer, Dr. David D. Keck; Secretary, Miss E. Crum.

Thursday, January 25, 1934. Dr. George J. Peirce, Department of Botany, Stanford University: "Sap Hydraulics." A business meeting preceded the lecture. The officers nominated at the December meeting, were unanimously elected.—E. CRUM.

THE STRUCTURE OF THE FLOWER OF NEWBERRYA

HERBERT F. COPELAND

Those plants, partly independent and partly saprophytic, which Engler and Prantl include in the family Pirolaceae (better spelled Pyrolaceae) are especially abundant in western North America. *Pyrola*, *Chimaphila*, and *Monotropa* are well known in many parts of the north temperate zone; in addition to these, the genera *Sarcodes*, *Pterospora* and *Pleuricospora* are well known to Californians. Representatives of the genus *Newberrya*, on the other hand, are rarities. Gray¹ described the genus from a plant collected by the Williamson expedition in the "Upper Des Chutes valley; September," 1855. The original description was erroneous in at least three respects. In the first place, the anthers, although recognizably represented in the plate, were comically misunderstood. Each anther was described as consisting of one fertile pollen sac and one sterile one. In consideration of this character, the plant was given the name *Hemitomes*, interpreted as "half-eunuch." Secondly, no disk or nectary was noticed. Thirdly, and with admitted uncertainty, the one-celled ovary was described as containing four bilamellate placentae. Torrey² presently corrected the description of the anther, and renamed the genus *Newberrya*, in honor of the botanist of the Williamson expedition. From Britton's³ proposal to resurrect *Hemitomes* (he misspelled it *Hemitones*) we are apparently saved by the priority of *Hemitomus* L'Her. *Newberrya* seems first to have been collected in California by Rattan, who found it in two places in Humboldt County; one collection was identified by Gray⁴ as the original *Newberrya congesta*, while the other was described as *N. spicata*. In the publication of these collections, Gray included description of a disk. When Small⁵ treated the genus, he distinguished five species; three of these are known to this day, apparently, by single collections, and two of the three were known to Small only by description. The herbaria of Stanford University and of the University of California include a total of less than a dozen specimens.

When a fresh specimen which, with some doubt, I call *Newberrya congesta*, came to hand,⁶ in June, 1932, I fixed parts of it

¹ Rep. Expl. Pac. R. R. 6²: 80, pl. 12. 1857.

² Ann. Lyc. 8: 7. 1864. Non vidi.

³ Bull. Torr. Bot. Club 20: 93. 1893. Gray's original plate is reprinted.

⁴ Proc. Am. Acad. 15: 44. 1879.

⁵ N. Am. Fl. 29: 17-18. 1914.

⁶ The miserable scrap came to the herbarium of the University of California for identification. I have regretably lost all record of the name of collector and place of collection.

MADRONO, vol. 2, pp. 137-166. November 15, 1934.

in Bouin's fluid; and in due course sectioned the material and stained it, mostly with saffranin and light green. The material is scant. It includes no roots; nor are these present on any of the herbarium specimens which I have seen. One supposes a compact globular cluster, like those of *Sarcodes*, *Pterospora*, and *Pleuricospora*. Little of interest is discovered in the sections of a couple of scraps of stem. The vascular tissue forms a thin cylinder lying between the large pith and the cortex; it consists mostly of elongate, thin-walled cells, with scattered patches of lignified, mostly spiral elements, on the inner border. The cylinder is much interrupted by large gaps⁷ where traces depart to the reduced vegetative leaves, the bracts, and the flowers. The compact terminal inflorescence is described by Jepson⁸ as consisting of cymelets, in which the lateral flowers are generally bisepalous and otherwise tetramerous, while the terminal flowers have the parts in greater numbers. The flowers which I have seen conform to the description of the lateral flowers. They are all in approximately the same stage of development, showing mature pollen grains and ovules ready for fertilization. In dealing with a common plant, one would wait for more material; the rarity of *Newberrya* may justify the presentation of an incomplete description.

The flowers (fig. 1) stand in the axils of bracts as long as themselves. The pedicels are stout and very short. This is a useful diagnostic character; by long pedicels I was able to pick out several specimens of *Monotropa* (or *Hypopitys*) which had been confused with *Newberrya* in herbaria. The sepals in most flowers are two (four in the flower from which fig. 3 was drawn; the fourth is outside the field of vision). The sympetalous corolla is obconical, with four lobes, each of which may be described as shallowly four-lobed, or, in other terms, as emarginate and auriculate.

The interior of the corolla is in my material sparsely white-hairy. Jepson's description, agreeing with many herbarium specimens, makes the interior of the corolla densely white-hairy. This difference is probably of taxonomic import. The same white hairs are scattered over bracts, sepals, filaments, ovary and style, and even inside the style channel, but not on the stigmatic surface. They are most abundant toward the summits of the filaments and in a collar-like mass on the style just below the stigma. Each hair is an extension of an epidermal cell, not cut off by a cross wall at the base nor divided by walls elsewhere.

⁷ Where the departure of the vascular supply to each leaf produces a single breach in the vascular cylinder, the nodes are said to be unilacunar. Cf. Sinnott in *Am. J. Bot.* 1: 303-322. This is the state of affairs in *Newberrya*, as in all *Ericales* except *Epacridaceae*.

⁸ *Man. Fl. Pl. Calif.* p. 739. 1925.

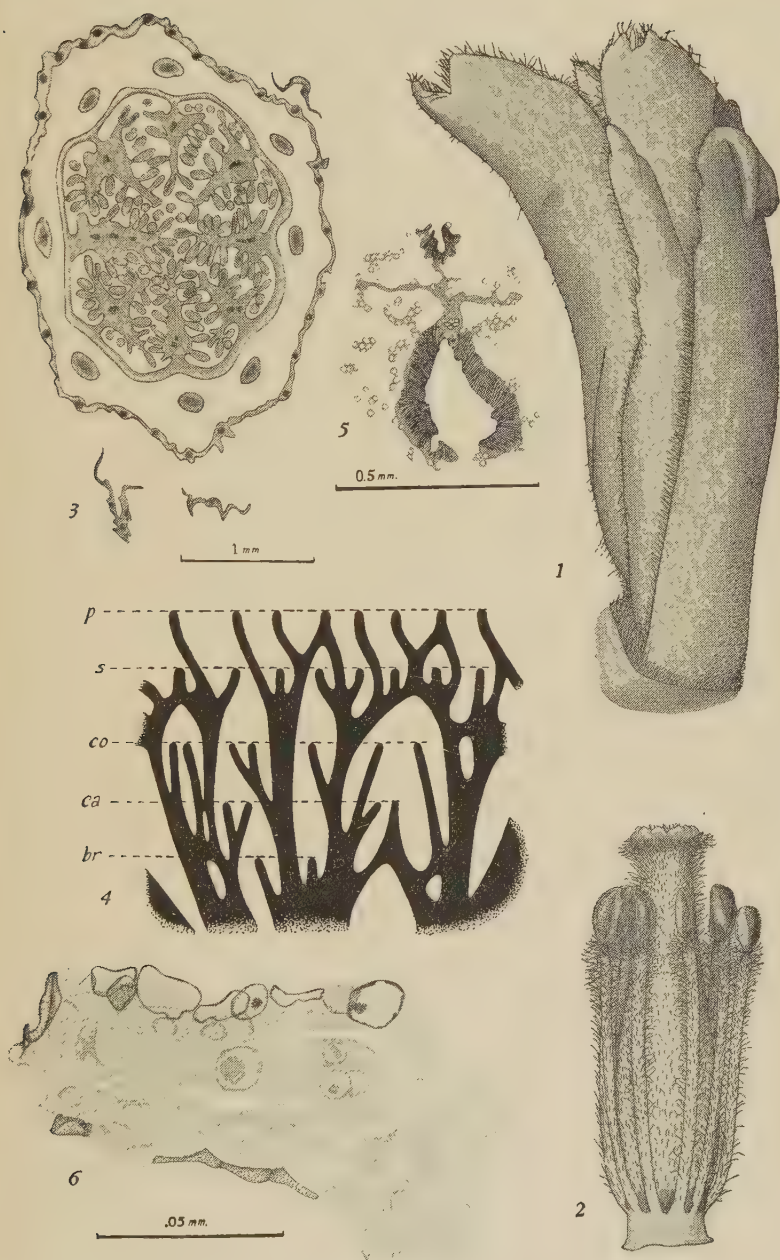


PLATE I. NEWBERRYA CONGESTA TORR.

The hair tapers to an exceedingly minute rounded point. The walls are marked externally by very fine lengthwise ridges, sometimes slightly spirally twisted. The structure of the protoplast is not clear; masses of stainable material appear, alternating with unstained spaces.

Within the corolla a brief column bears the pistil and stamens. The stamens are usually eight (nine in the flower from which fig. 2 was drawn). All the anthers in my material have undergone dehiscence, but their structure is evident from cross sections (fig. 5): each includes four pollen sacs, of which the ventral pair are larger than the dorsal. There is no endothecium of ribbed cells as in most angiosperms. Excepting the outermost layer, the exothecium, the wall cells are almost completely absorbed (compare Samuelsson's⁹ description of *Loiseleuria* and *Leiophyllum*, in which the structure of the anthers seems to be about the same). At first glance, the exothecium appears to consist of columnar, thick-walled cells; the fact, as nearly as I can make it out, is that they are originally nearly cubical, and that in contraction during dehiscence the walls are thrown into coarse wrinkles which give the columnar appearance. Dehiscence is through two lengthwise slits, which divide the wall into four valves; the valves swing outward till they are recurved, the edges of the two ventral valves meeting on one side, those of the dorsal valves meeting on the other. Gray originally mistook the space between the recurved ventral valves as a fertile pollen sac, and that between the dorsal valves as a sterile one. The pollen grains, as in *Ericales* in general, are binucleate; one nucleus is spherical, the other fusiform. The walls are smooth. As in other *Monotropoideae*, in distinction from *Ericales* in general, they are solitary, not in tetrads. These anthers call for comparison with those of *Pterospora*, *Pleuricospora*, *Pityopus*, and various species of *Monotropa*; but more data than we have must be assembled. Differences between the anthers of these various groups are known to exist; but resemblances of taxonomic significance will probably be discovered.

Oliver¹⁰ described the nectaries of *Sarcodes* and of *Monotropa glabra*, and pointed out these structures as likely to be of taxonomic interest. In *Newberrya*, the disk is a belt around the base of the ovary, from which dark-colored knobs project downward between the bases of the filaments. These knobs are somewhat more prominent than the corresponding structures of *Sarcodes*, but are not curved together in pairs embracing the bases of alternate filaments, as in *Monotropa glabra*. The "biological significance" of the column bearing stamens, disk, and pistil may be that in raising these structures from the base of the corolla it leaves a space for the accumulation of nectar.

⁹ Svensk. Bot. Tjld. 7: 69-188. 1913.

¹⁰ Ann. Bot. 4: 303-326. 1890.

The ovary is ovoid, the style brief, the capitate stigma divisible into eight lobes surrounding an eight-rayed orifice leading to the interior of the ovary. The ovary is one-celled. The interior is nearly filled by eight placentae lying in more or less the same radii of the flower as the stamens (the flower shown in fig. 2, having nine stamens, has nine placentae). In most previous publications, the placentae are described as bilamellate; in fact, in their best development, they are trilamellate and appear hastate in cross section. In the very bottom of the ovary, the lateral lamellae of adjacent placentae are coalescent, and the central lamellae fade out; the result is an appearance of eight lateral chambers surrounding a central one. In the upper part of the ovary, the lateral lamellae fade out, and the central ones continue upward as ridges in the style channel; they terminate as the lobes of the stigma. The whole ovary is of a structure of the ovaries found in other Ericales in the uppermost part, where the locules open into a central passage. It is evident that the eight placentae mark the boundaries of as many carpels. The stigmatic surfaces are of two kinds of cells, both full of dark-staining material. On the inner slope, toward the style channel, there are several layers of isodiametric cells; on the outer slope, toward the collar of hairs, there is on each lobe a single layer of closely packed columnar cells.

The placentae are covered with ovules. Each ovule (fig. 6) has an integument of two layers of cells, of which the outer layer stains differently from the inner, showing a marked affinity for saffranin. The embryo sac is of the normal type, having an egg apparatus of three cells, an endosperm mother cell containing (at this stage) one large nucleus, and three antipodal cells recognizable with difficulty. No trace of a nucellus is found at this stage. In all essentials, this is the usual ovule of Ericales and of sympetalous plants in general.

The vascular system of the flower is irregular. I puzzled out the relation of flower supply to bract supply only in one flower (fig. 4). One might expect the flower, standing in the axil of a bract, to be furnished with two traces, interpretable as running from the angles on the two sides of the bract trace where it swings out from the vascular cylinder of the stem. In the flower studied I found a third trace, formed by the bending inward of the middle part of the bract supply. The rest of the vascular system is described from three or four flowers. The several traces to the flower form an interrupted cylinder in the pedicel. Bundles supplying the sepals and corolla originate in no consistent fashion, and swing outward. Above the departure of these bundles, in the column, the vascular cylinder becomes more compact. Near the summit of the column the cylinder breaks up, essentially into sixteen bundles. Eight alternate bundles swing outward to supply the stamens. The other eight, being

recognizable as carpel traces, might be expected to fork trichotomously, each giving rise to a carpel dorsal bundle and two carpel ventrals. Actually, no carpel dorsals appear at this point; the bundles of the pistil supply, sometimes forking or anastomosing but usually merely swinging to the side, come to lie in the same radii of the flower as the stamens, and proceed upward in the placentae some distance inward from the ovary walls. They fade out in the upper part of the ovary. In the upper part of the ovary, and in the style, eight carpel dorsal bundles, each consisting of a few spiral tracheids, are found; they lie in the ovary wall, one of them between the radii of each two placentae. There is no connection between these bundles and the rest of the vascular system of the flower. The whole system gives an impression of erratic structure, related, presumably, to the saprophytic manner of life.

All authorities—Gray, Drude, Small, and Jepson—agree in placing *Newberrya* next to *Pleuricospora*. The possibility that *Monotropa* is quite as close a relative is suggested by a superficial yet striking character: in some species of *Monotropa* the pubescence of the pistil, including the collar below the stigma, resembles closely that of *Newberrya*. Drude¹¹ placed *Newberrya* and *Monotropa* in separate tribes; *Monotropa* is choripetalous and shows axile placentation. In classifying most groups, these characters would be accorded great weight, but among the saprophytic *Ericales* they appear to be unstable.

Sacramento Junior College,
Sacramento, California,
January, 1934.

EXPLANATION OF THE FIGURES. PLATE I

Fig. 1. Flower, $\times 5$.

Fig. 2. Flower with perianth removed, $\times 5$.

Fig. 3. Cross section of a flower, $\times 18$. A fourth sepal, lying at a distance to the upper left, is omitted.

Fig. 4. Diagram of the course of bundles in a flower, based on serial sections of the flower represented in Fig. 1. The bundles are represented as seen from within the stem, and in the upper part as if the vascular cylinder were unrolled. *br*, bundles leading to the bract; *ca*, to the two sepals; *co*, to the corolla; *s*, to the stamens; *p*, to the pistil.

Fig. 5. Cross section of an anther, $\times 56$.

Fig. 6. Longitudinal section of an ovule, $\times 490$. The drawing is reconstructed from two adjacent sections, each 10 microns thick.

¹¹ In Engler und Prantl Nat. Pflanzenfam. 4¹: 3-11. 1891.

THE OVERLAND JOURNEY OF THOMAS NUTTALL

WILLIS LINN JEPSON

At a very early date, near the beginning of the nineteenth century, Independence, Missouri, was a frontier post. Here was the starting place for the wagon trains for Santa Fe; here were plainsmen and hunters returning to the Rocky Mountains; here were trappers and fur-traders from the upper Missouri; and here in April, 1834, foregathered the men of the Wyeth Expedition bound for Oregon and notable to everyone interested in natural history, because two of the party were the naturalists Thomas Nuttall and John K. Townsend. Wyeth's company joined the annual fur-trading caravan which began its march from Independence to the far West on April 28, 1834.

Along the Platte River the party passed through a deep ravine and here we have the first note on Nuttall after leaving Independence. Says Townsend in his narrative: "The road was very uneven and difficult, winding amongst innumerable mounds six to eight feet in height, the space between them frequently so narrow as scarcely to admit our horses, and some of the men rode for upwards of a mile kneeling upon their saddles. These mounds were of a hard yellow clay, without a particle of rock of any kind, and along their bases, and in the narrow passages flowers of every hue were growing. It was a most enchanting sight; even the men noticed it, and more than one of our matter-of-fact people exclaimed *beautiful, beautiful!* Mr. Nuttall was here in his glory. He rode on ahead of the company, and cleared the passage with a trembling and eager hand, looking anxiously back at the approaching party, as though he feared it would come ere he had finished, and tread his lovely prizes under foot."¹ Thence the caravan proceeded by many days' journey to the Green River rendezvous of the Rocky Mountain men and on to the Portneuf branch of the Snake River, the site of Fort Hall. From this place a hunting party was sent out for a supply of game. Returning after a ten days' absence, to the camp, Townsend found Nuttall so extremely thin as to be scarcely recognizable and rallied him on his emaciated condition. Nuttall retorted that he, Townsend, would have been as thin had he lived for two weeks on nothing but short rations of tough old Ephraim. Old Ephraim was *Ursus horribilis*, the Grizzly Bear.

Leaving Fort Hall, Wyeth's party, consisting of thirty men and one hundred and sixteen horses, crossed the Snake River and headed for Fort Walla-walla on the Columbia. At Camas Prairie, in the present Elmore County, Idaho, the famished party ate the roots of *Camassia esculenta* boiled, and also those of *Eulophus ambiguus*. In the Blue Mountains Townsend made a

¹ Thwaites, Early Western Travels, 21: 179.

meal of rose-buds, only to find on returning to camp, that Nuttall and Captain Thing were picking the bones of a bird which they had cooked in his absence. It proved to be one of Townsend's specimens, an owl which he had killed that morning. So, says Townsend resignedly, "the bird of wisdom lost the immortality which it might otherwise have acquired."² On the journey down the Columbia River the canoes shipped much water in a storm and it was necessary to lay by on the bank. "Mr. Nuttall's large and beautiful collection of new and rare plants," says Townsend, "was considerably injured by the wetting it received; he has been constantly engaged since we landed yesterday, in opening and drying them. In this task he exhibits a degree of patience and perseverance which is truly astonishing; sitting on the ground and steaming over the enormous fire, for hours together, drying the papers, and re-arranging the whole collection, specimen by specimen, while the great drops of perspiration roll unheeded from his brow. Throughout the whole of our long journey, I have constantly had to admire the ardor and perfect indefatigability with which he has devoted himself to the grand object of his tour. No difficulty, no danger, no fatigue has ever daunted him, and he finds his rich reward in the addition of nearly a thousand new species of American plants, which he has been enabled to make to the already teeming flora of our vast continent."³

Completing a toilsome and hazardous journey, the travelers arrived on September 16, 1834, at Fort Vancouver where they experienced the noble hospitality of Dr. John McLoughlin, the Hudson Bay Company's factor. After a trip into the lower Willamette River with Captain Wyeth, Nuttall and Townsend sailed December 11, 1834, on the Brig, *May Dacre*, for a visit to the Hawaiian Islands and came back the next year to the Columbia River, arriving April 16, 1835.

Nuttall spent the entire summer botanizing on the Columbia, making one trip to the Dalles. He now wished to go to California, but the way to that Mexican province was somewhat roundabout. Trading vessels plied between the Hawaiian Islands and the Columbia River and between the Hawaiian Islands and Monterey, but not along the coast. Towards the end of September, 1835, Nuttall embarked on a Hudson Bay Company vessel and sailed a second time for the Hawaiian Islands, thence proceeding to California.

Nuttall has himself left a note of his arrival at Monterey in 1836. He writes: "The early spring (March) had already spread out its varied carpet of flowers; all of them had to me the charm of novelty, and many were adorned with the most brilliant and varied hues. The forest trees were new to my

² Thwaites, *Early Western Travels*, 21: 277.

³ Thwaites, *Early Western Travels*, 21: 289.

view. A magpie, almost like that of Europe (but with a yellow bill) chattered from the branches of an oak with leaves like that of the holly (*Quercus agrifolia*). A thorny gooseberry,⁴ forming a small tree, appeared clad with pendulous flowers as brilliant as those of a fuchsia. A new plane tree⁵ spread its wide arms over the rivulets. A ceanothus,⁶ attaining the magnitude of a small tree, loaded with sky-blue withered flowers, lay on the rude wood-pile, consigned to the menial office of affording fuel. Already the cheerful mocking bird sent forth his varied melody, with rapture imitating the novel notes of his neighboring songsters. The scenery was mountainous and varied, one vast wilderness, neglected and uncultivated; the very cattle appeared as wild as the bison of the prairies, and the prowling wolves (coyotes), well fed, were as tame as dogs and yelled familiarly through the village."⁷

Little has been known of Nuttall's movements in California. His botanical collections from this province of the Republic of Mexico, as well as those from the Rocky Mountains and the Columbia River, were very important, and with his notes, furnished the basis for numerous new species published by John Torrey and Asa Gray in their *Flora of North America*. From that work and from his herbarium labels we learn his botanizing stations in California. It was customary for travelers to journey from Monterey to Santa Barbara or southward by land with riding animals, stopping each night at one of the missions. It is certain that Nuttall made his way to Santa Barbara, not by land but by sea, and doubtless by sea the remainder of the journey to San Diego. Every one of Nuttall's specimens coming under my eye at New York, Harvard and Kew bears a ticket in his hand, with indication of the locality. The localities are the seaports, Monterey, Santa Barbara, San Pedro and San Diego. It is important to define his collecting grounds as closely as possible and it would seem also from the species collected that Nuttall's field work can be limited to the vicinity of the seaports. While in California he did not see *Quercus douglasii*, *Acer macrophyllum*, *Acer negundo* var. *californicum*, *Arbutus menziesii*, *Pseudotsuga taxifolia*, *Pinus sabiniana*, *Pinus Lambertiana*, *Abies bracteata* or *Fraxinus oregana*. All of these grow in Monterey county except possibly the last, while *Quercus douglasii* is exceedingly common on the old trail from Monterey to Mission San Antonio and Mission San Miguel.

That Nuttall went by sea part of the journey and probably all of it is evident from Richard Henry Dana's narrative, "Two Years Before the Mast." Dana speaks of Nuttall and says: "I

⁴ *Ribes speciosum* Pursh.

⁵ *Platanus racemosa* Nutt.

⁶ *Ceanothus thyrsiflorus* Esch.

⁷ Nuttall, *Silva*, ed. 2, 1: 10.

had left him quietly seated in the chair of Botany and Ornithology in Harvard University, and the next I saw of him, he was strolling about the San Diego beach, in a sailor's pea-jacket, with a wide straw-hat, and barefooted, with his trousers rolled up to his knees, picking up stones and shells."

"The second mate of the *Pilgrim*," continues Dana, "told me that they had an old gentleman aboard who knew me and came from the college that I had been in. He could not recollect his name but said he was a sort of oldish man, with white hair, and spent all his time in the bush, and along the beach, picking up flowers and shells and such truck, and had a dozen boxes and barrels full of them. I thought of everyone who was likely to be there but could fix upon no one; when, the next day, just as we were about to shove off from the beach, he came down to the boat in the rig I have described, with his shoes in his hand and his pockets full of specimens. I knew him at once, though I should hardly have been more surprised to have seen the Old South Steeple shoot up from the hide house." Nuttall had taken passage on the hide-ship *Pilgrim* at Monterey. He thus came slowly down the coast, examining the natural history of the country at each port of call, and finally boarding at San Diego the hide-ship *Alert* (on which Dana was a common sailor) shortly before she sailed, May 8, 1836, for Boston by way of Cape Horn.

Thomas Nuttall was born at Settle in Yorkshire, England, on January 5, 1786, and was apprenticed as a lad to his uncle, a printer in Liverpool. The print shop gave him the society of books and doubtless his greatest opportunity for self-education. He went to the United States in 1808 and became associated with the scientists at the Philadelphia Academy of Sciences. In 1809 to 1811 he accompanied John Bradbury on a trip into the Mandan country on the upper Missouri River and in 1819 he explored the Arkansaw territory and wrote a most readable journal of his travels in that region. In 1842 he returned to England to accept the estate of Nutgrove Hall bequeathed to him by his uncle.

In 1926, being in England, the writer made a journey to St. Helens and called at Eccleston upon Dixon Nuttall, a nephew of Thomas Nuttall, who as a child remembered talking with him. It was my hope to turn up, perhaps, some of Nuttall's journals, but all such material, taken to London shortly after his death, disappeared. I was received cordially by Mr. Nuttall of Eccleston. He stepped to the wall of his drawing room, took down a framed engraving of Nutgrove Hall as it was in Thomas Nuttall's day, and put it into the hands of one who was an utter stranger. I took the engraving into Liverpool and had it copied, returning it to its owner the next day. After visiting Thomas Nuttall's monument in Eccleston churchyard I went back to my regular work at the Kew Herbarium, filled with pleasant mem-

ories of that beautiful and quiet English countryside which is associated with the name of the botanist who of all the early botanical explorers in California makes the strongest appeal to our scientific understanding and to our intellectual sympathies.

SOME OBSERVATIONS ON TWO SPECIES OF ARCTOSTAPHYLOS

J. E. ADAMS

On the occasion of a visit to the type locality of *Arctostaphylos myrtifolia* and *Arctostaphylos viscida*, at Lone, Amador County, the writer was impressed by the generally unhealthy appearance of the chaparral growth on the low ridges east and southeast of the town, where it consists wholly of *Arctostaphylos* represented by the two above-mentioned species largely, and a very few individuals of *Arctostaphylos manzanita*. In these areas the ground is thickly strewn with bleached, dead stems and branches which show the peculiar flattened or ribbon-like form commonly associated with *Arctostaphylos myrtifolia*. The plants are exceedingly scraggly and distorted, and practically all bear many dead stems still attached to the root crown. Even the old living stems of most of the plants are deformed, bleached, and dead-looking at first glance. The absence of indications of fire damage led to a closer examination of these stems. Interestingly enough, it was found that the peculiar flattening of the stems is not at all confined to *Arctostaphylos myrtifolia*, but is quite general among the individuals of *Arctostaphylos viscida* in the region. Indeed, dead, detached stems of equal size of the two species can scarcely be distinguished. The following observations, then, apply generally to the phenomenon in both *Arctostaphylos myrtifolia* and *viscida*.

The ribbon-like development does not appear as though brought about by simple lateral compression of an otherwise normal stem, as would be inferred from the usual description, but, on the contrary, appears to be of a pathological nature. The dead stems appear to have suffered a gradual but complete decortication which seems to bear a direct relationship to the ribbon-like development. Old living stems show the peculiar flattening for a greater or smaller portion of their length mostly near their bases, and at first glance appear no different from the quite dead stems, although bearing green foliage. Closer examination of such members, however, reveals a narrow strip of living red bark along one edge only, while the greater portion of the surface is bleached and dead-looking. Generally the more pronounced the flat development, the narrower is the strip of living bark. The narrow strip of bark is underlain by a strip of

white sapwood. The bleached surface represents bare, desiccated wood, or in places this may support a crustaceous lichen-growth. The wood below such exposed surfaces is dark brown or reddish.

Younger branches of old individuals and the stems of young plants have not been observed to show this ribbon-like development, being generally terete. They do, however, show certain features which are thought to be related, to it, and which will be described below. Also, a few plants of *Arctostaphylos myrtifolia* growing isolated from the main groups and appearing vigorous and healthy, possess only normal, fully corticated, terete stems and branches. This peculiar ribbon-like development has

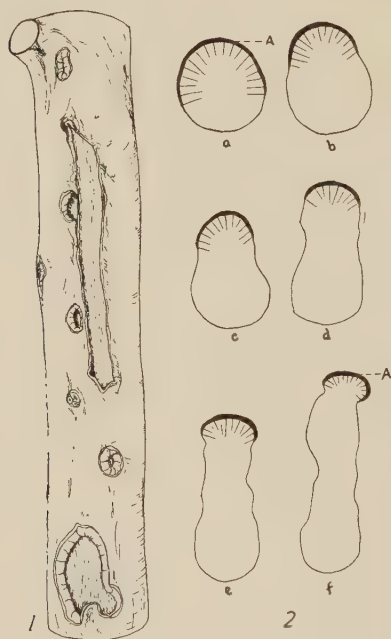


Fig. 1. Young branch of *Arctostaphylos viscida* with lesions at various stages.

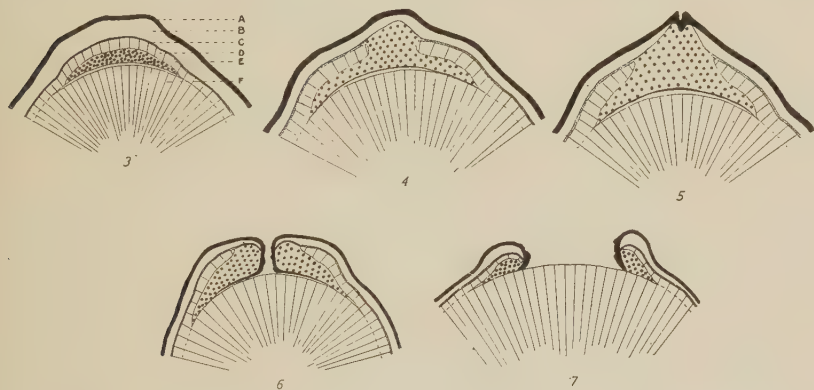
Fig. 2. Diagrams of sections of branches of *Arctostaphylos myrtifolia*, showing stages in ribbon-form development; extent of living bark, A; remainder, desiccated wood.

not been observed by the writer in *Arctostaphylos viscida* in other parts of its range.

Examination of the young, normally terete and fully corticated branches of *Arctostaphylos myrtifolia* and *viscida* and many of the stems of young individuals in the region, reveals a series of features which appear to be related to the decortication, peculiar ribbon-like development, and eventual death of the older branches and stems.

At various points toward the distal end on young stems and branches, there appear very small pustulous excrescences. These

small raised points are at first covered by smooth bark which appears eventually to break as the swelling increases, forming a very small linear lesion, about one line in length, around which the bark thickens slightly and becomes rough. The bark then gradually recedes from the point of initial break, producing a lesion generally elliptical and parallel with the axis, or varying to round or irregular. The receding bark exposes an area of wood, which, due to dessication, assumes a grayish, bleached color. The margin of these lesions continues to be rough and thickened as the bark recedes. This gradual recession of the bark and exposure of underlying wood proceeds rapidly in both directions along the axis, and more slowly around the circumference. A single lesion in a clear expanse of bark may thus give rise to an extensive denuded area; lesions arising in close



Figs. 3-7. Semi-diagrammatic drawings of lesion development in *Arctostaphylos viscida*. A, cork; B, phloem and cortex; C, cambial layer; D, current year's wood; E, callous growth; F, older wood. (Note break in periderm in Fig. 5; incipient recession of bark in Fig. 6; exposure of deeper wood beneath older lesion in Fig. 7).

proximity to one another may coalesce to give still larger decorticated areas. Thus the continued recession of bark exposes a large and larger surface of wood which promptly assumes the ashen color, and the extent of the living bark is eventually reduced to a narrow strip as the receding margins approach each other around the stem.

Meanwhile, however, cambial activity is proceeding normally in the healthy areas, producing new wood beneath and thus tending to raise the healthy areas considerably above the level of the originally exposed wood layer. In old lesions on a large stem this tends to produce deep furrows, at the base of which can be seen the first-exposed wood. In stems and branches of smaller size the continued growth of a narrow, healthy strip of bark along one side would clearly give rise, after a time, to

the peculiar flattened form. The relatively slower recession of the bark circumferentially would thus permit of a considerable one-sided development before death of the stem occurs, apparently by complete girdling, or a process amounting to that. The lateral spread of the decorticated area does not appear to be uniform at all points in extensive lesions, so that complete girdling may be effected at a lower point in the stem while the decorticated area at the upper end of the lesion may extend, for example, only one-quarter the way around the circumference. Thus most of the dead stems, attached and detached, are extremely flattened for some distance near the bases and gradually become terete toward the ends. The wood of completely dead

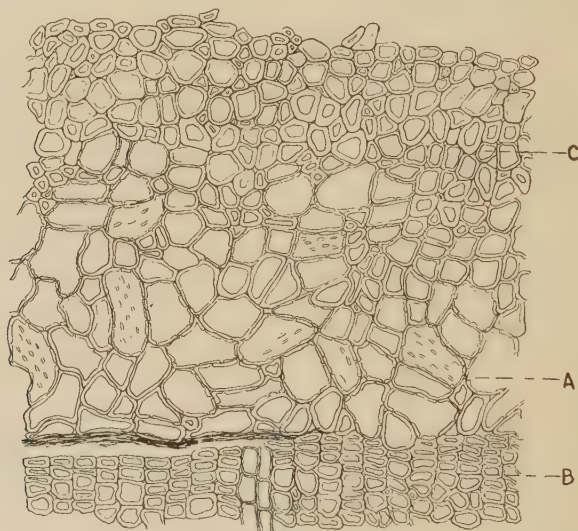


Fig. 8. *Arctostaphylos myrtifolia*. Section through incipient lesion, showing nature and extent of callous, A, with reference to old, B, and new, C, wood. (Camera lucida.)

branches which is not too weathered and that underlying the denuded areas appear to be sound and to have suffered no injury except desiccation and starvation resulting from decortication and girdling. Neither the surface nor deeper layers of the exposed wood appear to have decayed.

It is not the intention of the writer to delve into the pathology of the condition, but some observations on the histology of the structures involved, and suggestions therefrom may be of interest. Cross sections through the young pustules, or incipient lesions of young affected stems show normal intact bark raised slightly above the general surface so as to form a slight swelling or point. In material collected late in March a few to several cell-layers of this year's annual ring of wood immediately below

the distended bark are arched outward and thus follow the contour of the surface. This wood is sharply separated from the deeper layers by the interposition of a mass of large, thick- and porous-walled cells, which in turn is sharply delimited from the deeper wood by a well-defined line or break at the outer margin of last year's wood.

The circumferential extent of the interposed group of cells and of the line or break separating it from the deeper wood is about equal to or greater than the diameter of the pustule as seen in surface view. Radially, the interposed group is equal in extent to approximately the height of the pustule above the general surface of the stem. The line delimiting the interposed tissue from the underlying wood is generally dark in color, and where an actual break separates the two tissues, the cells immediately bordering the space on its outer margin are commonly brown and appear corky. The interposed tissue then appears to increase in radial and circumferential extent, accompanied by a break in the layers of wood and the bark above it, its own mass dividing radially into two parts. A narrow channel is thus created, extending from the underlying wood to the surface. The cells lining this channel become suberized. The two receding edges are thus capped by corky cells which extend inward to the break below the interposed tissue and continue circumferentially for a short distance along its inner margin. Although it appears probable that wound tissue is attempting to close these lesions, it is indicated by the nature of the wound and of the deformity that the healing process is defeated by the recessionary process.

The nature of the causative agent raises several questions. Sunburning does not recommend itself because of the nature of the wound, and species of the genus in other regions are equally exposed, yet do not show the condition, so far as observations go; and stems more or less continually shielded from the hot sun show the injury as frequently as strongly insulated members. It is supposed, however, that once the lesion is formed, desiccation may be a factor in the course and extent of the damage. It is observed that the flattened stems of *Arctostaphylos myrtifolia* which are prostrate upon the ground root freely at various points from the narrow strip of living bark generally on the underside. Otherwise, in both species the position of the living bark is not constant in relation to sun-exposure.

The nature of the condition at first suggested a parasite, possibly a fungus or bacterium, but microscopic examination of the tissues has revealed no organized parasite.

The position of the interposed tissue or callous-like growth invariably at the outer limit of last year's growth of wood may indicate that the initiating injury occurred after the cessation of growth in the fall and before the resumption of growth in the

spring. The over-arching wood represents the growth of the present year, produced by the active cambium simultaneously with the growth of the callous. The surface of the pustule shows no evidence of external mechanical injury, although it is very possible that extremely small insect punctures would escape detection. The very local occurrence of the condition would, however, seem to argue against the possibility of insect injury.

The presence of the pronounced line or break below the callous growth may be significant. The line or break appears to increase along the margin of the annual ring of wood slightly in advance of the callous. Any given break, once established at the margin of a wood layer, continues only along that margin. The process might thus be likened somewhat to checking, toward which the wood shows a pronounced tendency. Thus the separation of the layers of wood may serve as a secondary injury-stimulus to the further production of callous.

These suggestions are offered merely as interesting possibilities in the etiology of this peculiar condition. The writer is not prepared to undertake a detailed pathological study now. In the present connection, it is perhaps sufficient to emphasize that the peculiar ribbon-like development of the stems, well-known in *Arctostaphylos myrtifolia*, is clearly a pathological condition, manifest in its characteristic form only in later life. Its occurrence in many, but not all, individuals of the species, as well as its occasional occurrence in *Arctostaphylos viscida*, render untenable its use as a reliable systematic character.

University of California, Berkeley, July, 1934.

MARCUS EUGENE JONES

Caught in one of the numerous traffic accidents which prevail upon the public roadways of California, Marcus E. Jones was killed at San Bernardino on June 3, 1934, at the age of eighty-two. Born at Jefferson, Ashtabula County, Ohio, on April 25, 1852, his family moved during his late childhood to a farm in Iowa, where he later took a bachelor's and a master's degree at Iowa (Grinnell) College. The greater portion of his adult life he lived at Salt Lake City and had employment at a kind of mine inspection, a work which took him on many journeys over the Great Basin region and more or less throughout the Pacific portion of the United States. While on these travels he assiduously collected the native seed plants "on the side" and built up a large herbarium, doubtless the most valuable that has ever been made for the Great Basin. At the same time he acquired a field knowledge of the flora which enabled him to recognize and publish many species from western America, of which many have been well sustained. His "Contributions to Western Botany" comprise eighteen papers; the larger number of which with much

industry he set in type and printed himself. His "Monograph of the North American Species of *Astragalus*" (1923) he considered to be his opus magnum. For this he also set the type and printed the sheets.

It would have been natural and fitting that his herbarium should remain with some institution at or near Salt Lake City. However, the prescient enterprise of Professor P. A. Munz brought about its purchase for Pomona College and it has thus, at Claremont, been added to the botanical assets of California. For several years prior to his death Mr. Jones was the Honorary Curator of the Pomona College Herbarium.

The herbarium of Jones was of great interest and furnished convincing evidence of his zeal as a collector. It contained specimens gathered by him in Iowa in 1870, in California in 1934. In all the intervening years, for the amazing period of sixty-four years, he kept unremittingly on, botanizing throughout the West and down into Mexico. Hardy and resourceful in body, untiring, fitted to live on any food and sleep in any place, quite insensitive to the trials and difficulties which wear down most men of feeling and refinement, he was admirably fitted for his task and betrayed, as the years ran on, no sign of senility. But for the fatal accident that ended his life, he would undoubtedly have continued aggressively active for many many years.

In one of his autobiographic sketches Jones claims when in college to have had thorough training in Latin and Greek, and one would not wish to dispute it. Still anyone who has studied the beautiful language of Caesar and Virgil has thereby acquired a kind of power to produce lucid, expressive and forceful English not often to be had in any other way. This training implied by the Latin discipline is not obvious in Jones' writings. Botanists are often annoyed to find the content of his words dubious, or to find various descriptions defiant of meaning or sense. This is due, however, not to lack of Latin, but to a disorderly habit of mind which even Latin could not cure.

A not inconsiderable portion of his life Jones gave to personal attacks on various botanists. Here, interestingly enough, there is no doubt as to his meaning. Although these attacks were prolonged over so long a period no botanist answered his assaults, and this silence, never broken, seemed to exasperate him with the result that he became more savage as the years deepened. It would seem, we think, a strange way to spend a lifetime, but it is clear that he thoroughly enjoyed these one-sided battles. Ludicrous situations sometimes developed. A prominent Californian botanist, wishing to protect himself from criticism by Jones, laid a garland of flattery before him. Although extremely susceptible to such form of address, Jones overlooked the offering and flayed this man impartially. The expression of consternation on the face of this botanist as he read the next

issue of Jones' Contributions may be recorded by way of persiflage. Intermixed with all this diatribe one finds traces of sardonic humor that enliven the pages a bit; a definition of systematic botany as something which is done as far away as possible from the field where the living plants are found and with as little knowledge of them as possible.

Botanical history is full of eulogy of botanists with a sprinkling here and there of detraction. There is no objection to eulogy and doubtless detraction does not matter. That which matters in systematic botany is something utterly impersonal and has to do only with the plant and the records concerning it. At one time, long ago, botanists were well content to describe a new species from the "Northwest Coast" or from "California." Nowadays there is not only demanded an exact station, but also the essential facts regarding the edaphic conditions, associated species, climate and altitude. In this respect Jones' specimens are often deficient. His plants usually carry locality labels but the place name may be hopelessly obscure or be a duplicated place name.

This man has in California one or two strong admirers. One or both can perform a real service to western botany and do for Jones' records what he could not do for them himself, that is supply certain essential facts which will enable his stations to be defined. At this time a running itinerary would furnish the necessary clues. This is a plain duty. Caecilius Plinius Secundus has described well the stigma which attaches to a man who basks in the favor of another when living and yet refuses to do aught for him when he is dead. This canon of Roman manhood applies still to men of honor and sensibility. Let the one who has exalted Jones in life, turn not full away from him now that he is dead.—W. L. JEPSON.

CRITICAL NOTES ON ERIOPHYLLUM LAG.—II

LINCOLN CONSTANCE

The Achenes of *Trichophyllum multiflorum* Nuttall

Nuttall erected the genus *Trichophyllum* (1) upon *Actinella lanata* Pursh (2), and it was not until 1883 that the relation of this genus to *Eriophyllum* Lag. and *Bahia* Lag. was fully appreciated. During the period that the first genus was still considered valid, Hooker added to it *Trichophyllum integrifolium* (3), from specimens obtained by Douglas, and Nuttall described *Trichophyllum multiflorum* (4), which was based upon Wyeth's collections.

De Candolle (5) merged *Trichophyllum* and *Eriophyllum* with *Bahia*, and in 1876 (6) Gray reduced *Bahia multiflora* to synonymy with *Bahia integrifolia*, under the latter name. Seven

years later (7), he transferred this to *Eriophyllum*, where it constituted a part of *Eriophyllum caespitosum* var. *integrifolium*, a distinguishing character of which was that the achenes were "glabrous, rarely somewhat glandular-atomiferous near the summit" (8). Contrasted with this was *Eriophyllum gracile* Gray (7), synonymous with *Bahia gracilis* Hook. & Arn. (9) from Tolmie 69, "Snake County," with glandular achenes.

Rydberg revived Nuttall's species as *Eriophyllum multiflorum* (10), attributing to it glabrous achenes (11). Piper (12) took over this name for the common form of the Walla Walla Plateau, reduced to synonymy *Bahia gracilis* H. & A. (*Eriophyllum gracile* Gray), and described the achenes as glandular. Several botanists of the Northwest have followed him in this interpretation.

These diverse treatments may be summarized as follows:

A. GRAY: (a) Achenes "glabrous, rarely somewhat glandular-atomiferous near the summit"; *Eriophyllum caespitosum* Douglas var. *integrifolium* (Hook.) Gray (*Trichophyllum integrifolium* Hook.; *Trichophyllum multiflorum* Nutt.; *Bahia integrifolia* DC.; *Bahia multiflora* Nutt.). (b) Achenes glandular: *Eriophyllum gracile* (H. & A.) Gray (*Bahia gracilis* H. & A.).

B. PIPER: Achenes glandular: *Eriophyllum multiflorum* (Nutt.) Rydb. (*Trichophyllum multiflorum* Nutt.; *Bahia gracilis* H. & A.; *Eriophyllum gracile* Gray).

C. RYDBERG: (a) Achenes glabrous: *Eriophyllum multiflorum* (Nutt.) Rydb. (*Trichophyllum multiflorum* Nutt.). (b) Achenes "hispidulous, but rarely conspicuously glandular": *Eriophyllum integrifolium* (Hook.) Greene (*Trichophyllum integrifolium* Hook.; *Bahia integrifolia* DC.; *Eriophyllum caespitosum* var. *integrifolium* Gray). (c) Achenes "decidedly glandular-granuliferous": *Eriophyllum gracilis* (H. & A.) Gray (*Bahia gracilis* H. & A.).

The crux of the matter, then, is in the question: are the achenes of Wyeth's specimen glabrous, as asserted by Gray and by Rydberg, or are they glandular, as asserted by Piper? The writer had the opportunity to compare the type specimens of *Trichophyllum integrifolium* Hook., and *Bahia gracilis* H. & A. (loaned from Kew), with a photograph and achenes of the type of *Trichophyllum multiflorum* Nutt., obtained through the kindness of Dr. F. W. Pennell, from the Academy of Natural Sciences of Philadelphia. The achenes of *Bahia gracilis* were found to be glandular-muriculate. Those of *Trichophyllum integrifolium* and *Trichophyllum multiflorum* were alike in being, not glabrous, as Gray reported, but uniformly thinly hairy, with spreading, hyaline, clavate-lanceolate, non-glandular hairs.

If the distinction between glandular and non-glandular achenes is to be maintained, since all the other characters are quite similar in the three specimens, then Nuttall's species must

be considered synonymous with *Trichophyllum integrifolium* Hook., not with *Bahia gracilis* H. & A. The writer does not believe that this distinction in achene surface is of sufficient constancy or importance for separating any of the three, and proposes to place them together under *Eriophyllum lanatum* var. *integrifolium* (Hook.) Smiley (13).

- (1) Gen. N. Am. Pl. 1: 166. 1818.
- (2) Fl. Am. Sept. 560. 1814.
- (3) Fl. Bor.-Am. 1: 316. 1833.
- (4) Acad. Nat. Sci. Phil. Journ. 7: 35. 1834.
- (5) Prodr. 5: 656. 1836.
- (6) Bot. Cal. 1: 381. 1876.
- (7) Am. Acad. Proc. 19: 26. 1883.
- (8) Syn. Fl. 1²: 331. 1886.
- (9) Bot. Beechey Voy. 353. 1840.
- (10) N. Y. Bot. Gard. Mem. 1: 422. 1900.
- (11) N. Am. Fl. 34: 92. 1915.
- (12) U. S. Nat. Herb. Contr. 11: 583. 1906.
- (13) Univ. Calif. Publ. Bot. 9: 378. 1921.

University of California, Berkeley, December, 1933.

THE BOTANICAL EXPLORERS OF CALIFORNIA.—XI

WILLIS LINN JEPSON

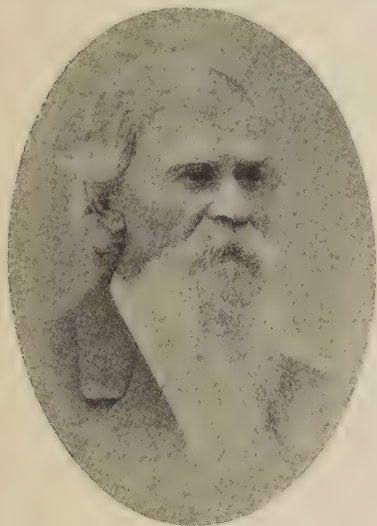
George W. Dunn

George W. Dunn was born in Seneca County, New York, on May 18, 1814. He taught a school of seventy-five pupils when he was sixteen. In 1850, when he was thirty-seven, the mining excitement of gold days drew him to California. For several years he worked in the placer mines, but lost all his money. From this moment he determined that he would try no further to make money and so turned collector for the rest of his life. From about 1860 until the time of his death in 1905, he gave his entire time to collecting a great variety of natural history objects, but especially plants and beetles. In the course of this work he traveled widely over California and made twelve trips into Lower California. He was with E. L. Greene on the expedition to Guadalupe and Cedros islands in 1885.

An extremely well known collector in early days, he was perhaps the most remarkable physically of any such in California. When scarcely more than a lad it was my chance to meet him for a few minutes. He was then seventy-seven, straight, powerfully built, full six feet tall, his head crowned by a dense thatch of gray-white hair. When eighty-eight he still climbed pine trees near one hundred feet high for cones, and at that time told me that he slept over night on the ground anywhere at will.

He was the discoverer of many new species; amongst others he first made known *Quercus Palmeri* Engelm from Lower California. This oak was named *Quercus Dunnii* by Albert Kellogg but Kellogg's publication was a little late and so failed in

priority. Mr. Carl Purdy, in a revisional paper, named *Calochortus Dunnii* in his honor in 1901, based on material collected by him at Julian, San Diego County.



GEORGE W. DUNN

For many years San Diego was his home and he here maintained near the heart of the city a curious naturalist's den piled to the ceilings with plant and animal materials of all kinds. Dunn was one of the contributors to *Zoe*. Accordingly, we note an article, "Tiger Beetles of California," appearing in volume two of that journal, along with another, "Coleoptera and Mollusca of the Ocean Beach at San Francisco." Long associated with the California Academy of Sciences, he was elected a resident member on March 16, 1874. The year 1892 finds him a resident of

San Francisco again where he was a member of the California Zoological Club of that city.

REBECCA MERRITT AUSTIN

During the entire period of a long life of botanical field work in northeastern California, Mrs. Austin invariably distributed her material under the name R. M. Austin and her letters and articles were so signed so far as known to me. Her full married name was Rebecca Merritt Austin. The name as given in my biography of her on page 130 preceding is an error and was derived from an old letter not written by her.

As time passes it is evident that many species collected by Mrs. Austin in Butte, Plumas, Lassen and Modoc counties have been found only once in that region or only once in California. Recently I noted that the rather conspicuous *Lysimachia thyrsiflora* L. collected by her at Big Meadows in Plumas County sixty years ago or so has never been found since. Likewise *Boykinia ranunculifolia* is still known from California only from her collections. Other rarities found by her which need re-collecting are *Utricularia intermedia* Hayne and *U. minor* L.—W. L. J.

TWO MORE SIERRAN PLANTS IN SOUTHERN CALIFORNIA

LOUIS C. WHEELER

Several species of plants are known to occur in the high mountains of southern California which normally occur in the Sierra Nevada and northward. To those already recorded may be added:

Glyceria pauciflora Presl, previously reported as far south as the central Sierra Nevada, was collected along a shady stream about 2 miles east of Bluff Lake, San Bernardino Mts., Aug. 22, 1932, at 7800 feet elevation, *Wheeler* 1245. Unfortunately only two sheets were collected; one is in my herbarium and the other forwarded to Dr. A. S. Hitchcock, who made the determination.

Sambucus racemosa L., previously reported as far south as Placer County in the Sierra Nevada, occurs as several shrubs 1 to 1.5 meters tall at Dollar Lake, 9250 feet, San Bernardino Mts., and was collected Aug. 22, 1932, *Wheeler* 1217. These were growing on a sunny talus slope, probably with available underground water. The shiny red berries drew my attention to the shrubs. Fortunately several sheets were collected; in addition to my herbarium, specimens have been deposited in the California Academy of Sciences Herbarium and other principal California herbaria.

La Verne, August, 1934.

OPEN LETTERS

When does the Redwood bear seeds?

Some years ago in one of our meetings the Society debated the age of redwoods when bearing seed for the first time but had no definite data to work upon. In November, 1923, I procured material for cuttings of *Sequoia sempervirens* from Redwood Peak and in the fall of 1924 planted them out in city park at Piedmont. Last year one tree fruited and the same, together with 4 or 5 others, is fruiting this year. In the summer of 1925 I happened to be at the Armstrong Grove and under the tree dedicated to Col. Armstrong picked up a few seeds. These I planted the same fall (1925) and I find several trees in cone already, earlier than I ever expected.—F. HEIN, Piedmont, July 19, 1934.

Pinus insignis* and *Pinus radiata

No one seems to have differentiated between the two Monterey pines until recent years, yet there are several differences between the two trees. *Pinus insignis*, the two-needled Monterey pine, was found on the famous Huckleberry Hill of the

Monterey Peninsula in February 1932. This tree has mostly two needles in the fascicle while *Pinus radiata* has needles in threes. *Pinus insignis* grows only in the sheltered hollows free from the strong ocean breezes and only in park shape. The boughs spread gracefully and are always in whorls. It is to be noted that this tree has a light growth of foliage, enabling one to easily see the trunk, limbs, and twigs. In common English the tree looks a trifle bald-headed, whereas *Pinus radiata* is so well supplied with needles that the woody parts are hidden behind its dark green foliage.

The wood of the two pines is decidedly different. *Pinus insignis* wood is dry and brittle; the tips of the branches often snapping off with the wind. *Pinus radiata*, on the other hand, is plentifully supplied with resin and will endure the strong westerlies with little casualties. Many of the *radiata* specimens are decidedly weather-beaten and whipped nearly to the ground. Others form timber belts throughout this region. Its timber is used for telephone poles and wharf piling with good results. *Pinus insignis* is of very little use commercially unless possibly for fuel.

Pinus insignis is not more than fifty feet in height and about two and a half feet in diameter breast high. *Pinus radiata*, in contrast, grows to a greater size, as when near an underground stream or lagoon it reaches one hundred and twenty-five feet, sometimes measuring four feet in diameter. *Pinus radiata* may have several main trunks, while *insignis* has typically only one or it may branch at about twenty feet. As to the root systems of these two trees: several have been taken out by the roots and of these many are known to have had enormous tap roots. Is this characteristic of *Pinus radiata*? I should believe not although I've not checked one of the uprooted trees since distinguishing between the two Monterey pines. Therefore, I'm unable to state which of the two trees have the tap roots.

The *Pinus radiata* cone is marked with definite diamond-shaped scars on each scale, while that of *insignis* is larger, without the scars on the scale tips, which are more rounded. The pollen grains of the two pines differ in that those of *Pinus insignis* under oil immersion are larger, the air sacs are closer together with the living portion inflated considerably, giving the pollen grain a barrel shape. The pollen grain of *radiata* is smaller, the air sacs farther apart and the body with nearly straight sides, hence more nearly cylindrical in shape.—LORIN R. TODD, Pacific Grove, Apr. 12, 1934.

There are two Monterey pines, here referred to as *Pinus radiata* and *Pinus insignis*. These need not necessarily be considered distinct species taxonomically but they are marked races with good differences and distinctive hereditary characters.—W. L. J.

THE ANNUAL DINNER FOR 1934

Eighty-five persons attended the annual dinner of the California Botanical Society which was held in the Banquet Room of the International House, Piedmont Avenue and Bancroft Way, Berkeley, at 6:00 p.m. on Saturday, March 3, 1934. The president, Dr. Peirce, acted as toastmaster. After the banquet Dr. Chauncey D. Leake of the University of California Medical School, San Francisco, gave an illustrated lecture on the "Development into Rational Therapy of Empirically Used Plant Products." Dr. Leake traced historically the progress of therapy along two lines: the isolation or synthesis of the active chemical principle of the drug plant, and secondly, the standardization of the product for medicinal use where the isolation or synthesis is not yet accomplished. Mr. W. W. Carruth of Mills College and one of his students offered the evening's music.—E. CRUM.

THE SPRING FIELD TRIP

The society's spring field trip was taken to the Big Basin in the Santa Cruz Mountains, Saturday, April 14, 1934. After a picnic lunch near the council ring in the basin several field excursions were made by small parties to nearby areas. *Ceanothus* were in full bloom. The party returned to Palo Alto, the place of departure, for dinner at the Stanford Students' Union. At 8:00 o'clock a meeting was held in Room 460, Physiology Building, Stanford University, when Dr. Peirce occupied the chair, introducing Dr. L. L. Burlingame, Professor of Biology at the university. Dr. Burlingame spoke on "The Significance of Plant Hybrids," treating the subject from the historical viewpoint—E. CRUM.

NOTES AND NEWS

The genus *Panicum* is very moderately represented in California but anyone devoted to the grasses will read with both interest and profit a paper on "Realignments in the Genus *Panicum*" by Dr. M. L. Fernald of Harvard University. Many things, heretofore hidden or secluded, are made known and have a significance outside the genus that is being discussed. (*Rhodora* 36: 63-87,—1934).

Dr. A. S. Foster, from the Department of Botany, Oklahoma State University at Norman, became Assistant Professor of Botany at the University of California this fall. He is a specialist in the fields of plant anatomy and morphogenesis.

An abridgement of the International Rules of Botanical Nomenclature adopted by the Fifth International Botanical Congress, Cambridge, 1930, has been prepared chiefly by A. B.

Rendle and appears as a twenty-nine page supplement to the *Journal of Botany*, volume 72, number 858, June 1934. The complete report in French, English, and German is in preparation.

Dr. Douglas H. Campbell, emeritus professor of botany at Stanford University, went to Costa Rica in March to obtain critical material of liverworts. From there he went to Washington, D. C., to attend meetings of the National Academy of Sciences.—D. D. KECK.

Botanical advances in all fields were delineated at the ninety-fourth meeting of the American Association for the Advancement of Science held in Berkeley, June 18 to 23. Two symposia, the origin and development of the north Pacific floras and the absorption and accumulation of mineral elements by plant cells, were among the full program of meetings. Dr. Göte Turesson, Botanical Institute, University of Lund, spoke on "Ecotypic Constitution and Geographic Distribution."—E. CRUM.

Following the Berkeley meetings of the Association the Division of Plant Biology, Carnegie Institution, held a conference at Stanford for the discussion of various aspects of its program in experimental taxonomy. At the June 25 and 26 sessions 36 scientists were in attendance. The problems in the *Madinae*, *Zauschneria* and the general transplant program were considered. Following these sessions a smaller group visited the transplant stations of the Institution in the Sierra Nevada, returning by way of the Institute of Forest Genetics at Placerville. Dr. Göte Turesson was brought to the conference and his ecotype theory was introduced to the western botanists there. Dr. A. F. Blakeslee, Department of Genetics, Carnegie Institution, and Dr. S. F. Blake, Bureau of Plant Industry, among others attended the conference from the eastern seaboard.—D. D. KECK.

Recent taxonomic papers originating at Pomona College are: "Revision of the *Heuchera rubescens* Group (*Saxifragaceae*) for the United States" by Margaret G. Stewart (*Bull. S. Calif. Acad.* 33: 42-49,—1934) and "A Revisional Study of the Species *Erigeron foliosus* Nutt." by Gladys Compton (*op. cit.* 33: 50-54,—1934).

The Sixth International Botanical Congress will convene at Amsterdam from September 9 to 14, 1935. Professor Dr. F. A. F. C. Went (Utrecht) has been chosen president by the executive committee; Vice-President, Prof. Dr. J. C. Schoute (Groningen); Treasurer, Dr. W. C. de Leeuw (Bilthoven) and Dr. M. J. Sirks (Wageningen), Secretary (*Science* 75: 306).

Of interest to the student of the walnut and the California orchardist is a well-illustrated Technical Bulletin 387, entitled "Pollination and Blooming Habits of the Persian Walnut in California" by Milo N. Wood, Bureau of Plant Industry, United States Department of Agriculture.

The Annual Report of the Santa Barbara Museum of Natural History, issued July 1934, announces Miss Lucile Duff as assistant in botany at the museum. The museum herbarium now contains 17,601 sheets, largely resulting from the efforts of the late Ralph Hoffmann.

"More Fern Notes from California" by Joseph Ewan, Department of Botany, University of California, appeared in *Amer. Fern Jour.* 24: 1-9,—1934.

Dr. Lincoln Constance, who took over a position at Washington State College, Pullman, this fall, being also in charge of the herbarium there, published "A Preliminary Revision of the Perennial Species of *Eriophyllum*" this summer (*Proc. Nat. Acad. Sci.* 20: 409-413).

A biography of Harvey Monroe Hall by Professor E. B. Babcock, carrying a portrait and list of his published writings, has been issued by the University of California Press (*Univ. Calif. Publ. Bot.* 17: 355-368).

Continuing "Studies in the Boraginaceae," Dr. I. M. Johnston, Research Associate, Arnold Arboretum, has published a revisional paper on *Plagiobothrys* (sect. *Allocarya*) and sundry notes on western borages (*Contrib. Arn. Arboretum* 3: 1-102,—1932).

Professor P. A. Munz, Department of Botany, Pomona College, made a summer field trip of six weeks across Utah, Idaho, Colorado and New Mexico in search of fruiting material of the *Onagra* group of *Oenothera* in continuation of his taxonomic studies of the evening primroses.—D. D. KECK.

Two papers on west American willows by Dr. Carleton R. Ball, University of California, that have appeared recently are: "Two New Varieties of *Salix scouleriana* Barratt" (*Jour. Wash. Acad. Sci.* 24: 73-78,—1934) and "New or Little Known West American Willows" (*Univ. Calif. Publ. Bot.* 17: 399-434,—1934). The eight plates illustrating the latter paper are of the highest quality.—J. EWAN.

An admirably illustrated periodical unfamiliar to many California plant growers is the British "New Flora and Silva." The July number carries an article, "The Native Flora of the California Redwood Forests," by Lester Rowntree.—J. EWAN.

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